Registered at the G.P.O., Sydney, for Transmission by Post as a Newspaper. Published Weekly.

THE

MEDICAL JOURNAL OF AUSTRALIA

(With which "The Australasian Medical Gazette," and "The Australian Medical Journal" are incorporated.)

The Journal of the Australian Branches of the British Medical Association.

VOL. I.—5TH YEAR—NO. 20. SYDNEY: SATURDAY, MAY 18, 1918. PRICE 6D.

JUL 10 1918

Allen & Hanburys Ltd.

MAKERS OF

SURGICAL INSTRUMENTS

SUPPLIERS TO

H.M. ARMY and H.M. NAVY

ALL INSTRUMENTS ARE OF THE

BEST BRITISH WORKMANSHIP

AUSTRALASIAN BRANCH:

B.M.A. BUILDING, ELIZABETH STREET, SYDNEY

INGRAM'S

"Eclipse"

British-made

HOT WATER BOTTLES

Ingram's "Eclipse" (Regd.) Hot Water Bottle is well known throughout the world for its reliability and perfect construction, and its adaptability to all conditions and climates.

Made by the Firm of "Ingram's, London." Specialists in the scientific manufacture of Surgical Rubber Goods for 70 years, and whose brand is a Guarantee of Quality.

Fitted with Patent Rubber Covered Screw Stopper (No. 107940). The object of this important invention is to overcome the loss of washer and leakage. A glance at Fig. 1 shows the sectional view, the black solid parts representing the rubber covering gripping (1) the brass flange making it a fixture, so that no loss of washer is possible, the broad solid seating (2) when the stopper is screwed down renders it **absolutely watertight.**

Fig. 1.
PATENT NO. 107940.

GUARANTEE.—Ingram's "Eclipse" Hot Water Bottles are personally examined and tested under strict supervision as to the Quality of Rubber, Workmanship, etc., and we assure our patrons that with careful use in any climate, and storage under favourable conditions, these high-grade quality "Eclipse" Hot Water Bottles are warranted to give entire satisfaction, and will remain in a perfect state for a number of years.

Made in all sizes, and can be supplied with JUG or LOOP HANDLES. COCKBURN'S Pattern Attachment fitted if desired.

Size, inches	10x6	10x8	12x6	12x8	14x8	14x12	16x12

J. G. INGRAM & SON
LIMITED
The London Indiarubber Works
HACKNEY WICK, E. 9
LONDON, ENGLAND

ESTABLISHED 1847

Manufacturers of Every Description of
Surgical Indiarubber Goods

Telegrams: "Ingram's, London"

THE MEDICAL JOURNAL OF AUSTRALIA.

VOL. I.—5TH YEAR. SYDNEY: SATURDAY, MAY 18, 1918. No. 20.

AGGLUTINATION AFTER THE ADMINISTRATION OF TYPHOID AND PARA-TYPHOID VACCINES.[1]

A Thesis presented for the degree of Doctor of Medicine.

By **William Keith Inglis, M.B., Ch.M.,**

Captain, Australian Army Medical Corps, Australian Imperial Force, and Demonstrator in Pathology, University of Sydney.

(*Continued from page 387.*)

Table IX.

Only three cases are recorded in this table, Nos. 72, 73 and 74, and the results in each are graphically represented in Charts IV., V. and VI. respectively.

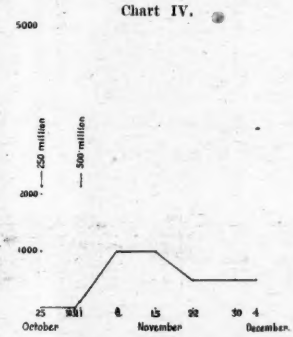
Unless otherwise noted, all injections were given, and specimens of blood taken at about 1 p.m.

Note the close resemblance of these results to those recorded in Table VI.

On the fifth day all gave negative results.

Agglutinins first appeared on the sixth day in Nos. 73 and 74, and on the seventh day in No. 72. As in Table VI., the rise in titre is very rapid.

Chart IV.

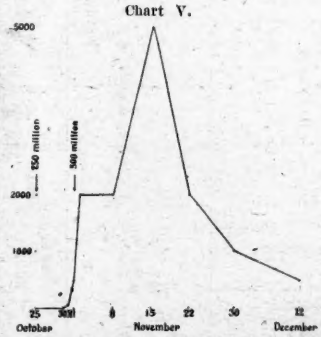


Case 72.—*B. typhosus* vaccine II. *B. typhosus* emulsion II. Graph of agglutinin content of the blood serum after two injections of typhoid vaccine.

In No. 72 the agglutinins are the slowest to come, the most gradual to rise, and the maximum titre attained is the lowest of the three cases. It is interesting to note that though the agglutinin response was comparatively feeble in this case, the clinical reaction, both local and general, after each injection was more marked than in the other two. This, however, is apparently the exception and not the rule.

It will be seen that, though the titre in No. 72 does not rise very high, when the last tests were made the difference in titre between the three cases was only slight.

Chart V.



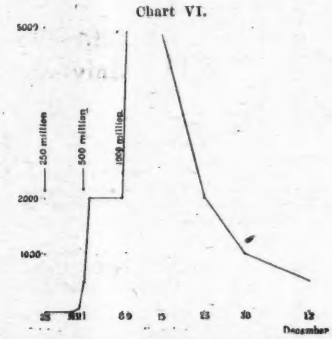
Case 73.—*B. typhosus* vaccine II. *B. typhosus* emulsion II. Graph of agglutinin content of the blood serum after two injections of typhoid vaccine.

The maximum was attained in No. 72 between the eighth and fourteenth days; in No. 73 after the fourteenth and before the twenty-first day; in No. 74 on the fifteenth day.

No. 74 closely resembles No. 67 (Table VI.). In both of these cases the maximum titre was recorded on the day following the third injection.

In No. 74 there was a definite rise in titre between the fourteenth and fifteenth days. Probably this was due to the added stimulation of agglutinin production due to the third injection. Possibly it was due merely to the time that had elapsed since the first injection, fourteen days in this instance, as in No. 73,

Chart VI.



Case 74.—*B. typhosus* vaccine II. *B. typhosus* emulsion II. Graph of agglutinin content of the blood serum after three injections of typhoid vaccine.

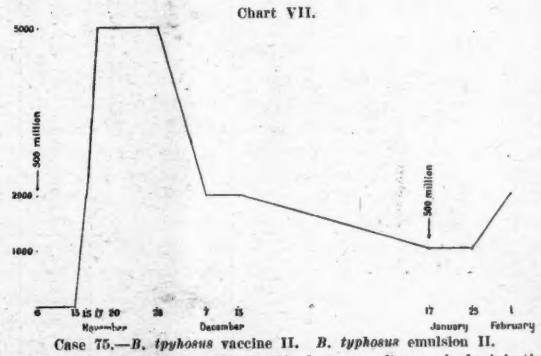
being insufficient for the attainment of the maximum titre.

In this table, as in Table VI., there is complete absence of any evidence suggesting the development of a negative phase of agglutination.

Table X.

The idea in this experiment was to find what would happen after a single dose of vaccine. Two

Chart VII.



Case 75.—*B. typhosus* vaccine II. *B. typhosus* emulsion II. Graph of agglutinin content of the blood serum after a single injection of typhoid vaccine, and for fifteen days after re-inoculation with the same dose more than ten weeks later.

individuals, 75 and 76, are recorded in the table, and graphs are given in Charts VII. and VIII. It will be seen that the maximum attained was just as high, and the agglutinins apparently persisted almost, if not quite, as long as in individuals who received several injections of the vaccine.

Table IX.—B. typhosus vaccine II. B. typhosus emulsion II.

Number	Age in Years.	Weight in Pounds.	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions
72	22	147	25.10.'16	—	250	30.10.'16	—	Nil	31.10.'16	—	Nil	—	—	—	1.11.'16 10 a.m.	+ 1 in 100 100 secs.	500
73	21	135	25.10.'16	—	250	30.10.'16	—	Nil	31.10.'16	+ 1 in 50 90 secs.	Nil	—	—	—	1.11.'16 10 a.m.	+ 1 in 500 60 secs.	500
74	22	139	25.10.'16	—	250	30.10.'16	—	Nil	31.10.'16	+ 1 in 50 70 secs.	Nil	1.11.'16 9 a.m.	+ 1 in 500 60 secs.	500	1.11.'16 10 a.m.	+ 1 in 500 60 secs.	Nil

Table IX.—B. typhosus vaccine II. B. typhosus emulsion II. (*Continued*).

Number	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions
72	1.11.'16 11 a.m.	+ 1 in 100 110 secs.	Nil	1.11.'16 2 p.m.	+ 1 in 100 70 secs.	Nil	1.11.'16 7.30 p.m.	+ 1 in 100 70 secs.	Nil	—	—	—	8.11.'16	+ 1 in 1,000 120 secs.	Nil	—	—	—
73	1.11.'16 Noon	+ 1 in 1,000 100 secs.	Nil	1.11.'16 2 p.m.	+ 1 in 1,000 60 secs.	Nil	1.11.'16 6.30 p.m.	+ 1 in 2,000 120 secs. (trace)	Nil	2.11.'16	+ 1 in 2,000 60 secs.	Nil	8.11.'16	+ 1 in 2,000 50 secs.	Nil	—	—	—
74	1.11.'16 Noon	+ 1 in 1,000 110 secs.	Nil	1.11.'16 2 p.m.	+ 1 in 1,000 90 secs.	Nil	1.11.'16 6.30 p.m.	+ 1 in 2,000 120 secs. (trace)	Nil	2.11.'16	+ 1 in 2,000 50 secs.	Nil	8.11.'16	+ 1 in 2,000 60 secs.	1,000	9.11.'16 1 p.m.	+ 1 in 2,000 50 secs.	Nil

Table IX.—B. typhosus vaccine II. B. typhosus emulsion II. (*Continued*).

Number	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions
72	—	—	—	15.11.'16	+ 1 in 1,000 70 secs.	Nil	22.11.'16	+ 1 in 500 120 secs.	Nil	30.11.'16	+ 1 in 500 120 secs.	Nil	4.12.'16	+ 1 in 500 110 secs.	Nil	—	—	—
73	—	—	—	15.11.'16	+ 1 in 5,000 90 secs.	Nil	22.11.'16	+ 1 in 2,000 70 secs.	Nil	30.11.'16	+ 1 in 1,000 60 secs.	Nil	12.12.'16	+ 1 in 500 80 secs.	Nil	—	—	—
74	9.11.'16 7 p.m.	+ 1 in 5,000 60 secs.	Nil	15.11.'16	+ 1 in 5,000 70 secs.	Nil	23.11.'16	+ 1 in 2,000 60 secs.	Nil	30.11.'16	+ 1 in 1,000 90 secs.	Nil	12.12.'16	+ 1 in 500 90 secs.	Nil	—	—	—

Table X.—B. typhosus vaccine II. B. typhosus emulsion II.

Number	Age in Years.	Weight in Pounds.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions
75	21	147	500	13.11.'16	+ 1 in 20 60 secs.	Nil	—	—	—	15.11.'16	+ 1 in 2,000 60 secs.	Nil
76	21	150	250	13.11.'16	+ 1 in 20 110 secs.	Nil	14.11.'16	+ 1 in 200 90 secs.	Nil	15.11.'16	+ 1 in 5,000 120 secs. (trace)	Nil

Table X.—B. typhosus vaccinet II. B. typhosus emulsion II. (*Continued*)

Number	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions
75	20.11.'16	+ 1 in 5,000 90 secs.	Nil	28.11.'16	+ 1 in 5,000 120 secs.	Nil	7.12.'16	+ 1 in 2,000 70 secs.	Nil	13.12.'16	+ 1 in 2,000 80 secs.	Nil
76	20.11.'16	+ 1 in 5,000 60 secs.	Nil	27.11.'16	+ 1 in 5,000 100 secs.	Nil	7.12.'16	+ 1 in 1,000 70 secs.	Nil	13.12.'16	+ 1 in 1,000 60 secs.	Nil

Number	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions
75	17.11.'16	+ 1 in 5,000 60 secs.	Nil	—	—	—
76	17.11.'16	+ 1 in 5,000 50 secs.	Nil	—	—	—

The individual No. 75, though he had not previously had typhoid fever or any inoculation, to the best of his knowledge, gave a positive result at the commencement of the experiment. The clinical reaction following his inoculation was much more marked than

Chart VIII.

Case 76.—*B. typhosus* vaccine II. *B. typhosus* emulsion II.
Graph of the agglutinin content of the blood serum after a single injection of typhoid vaccine, and for fifteen days after re-inoculation with the same dose more than ten weeks later.

usual, both as regards the local and general effects. The redness and swelling at the site of inoculation, which was made in the lower third of the upper arm, spread to involve the upper third of the forearm. The rate of fall in No. 76 was less gradual than in No. 75, probably owing to the smaller dose received by the former.

It seems doubtful whether these curves would have been appreciably altered if subsequent doses had been given.

As will be seen later (Table XVIII.), both of these individuals were re-inoculated more than three weeks after the first injection, and in each case the production of agglutinins was less marked after reinoculation than it was after the original injection.

The lessened agglutinin response may indicate lessened susceptibility, and therefore greater immunity.

Table XI.

This table, like Table X., shows the effect of a single dose of vaccine in stimulating the production of agglutinins in the blood serum.

No. 81 received the same dose as No. 76, but the agglutinins appeared later, and did not rise to as high a level. Still, the titre, ten weeks after inoculation, was probably about the same in both cases. This is further evidence of the fact that the height to which the agglutinin curve rises, is not necessarily an indication of the length of time a high titre will be maintained.

It will be seen later (Table XVIII.) that, in this case, reinoculation had no effect on the agglutinin content of the blood serum, at all events for fifteen days after the administration of the second dose.

Curve of Agglutination After Inoculation.

Russell (1910) (4) followed a large number of cases through weekly blood tests, and found that, while agglutinins were sometimes increased on the fourth

day, they were always marked by the sixth or eighth day, shooting up rapidly to ten or even twenty thousand. The fall began in about six weeks, and in one case, after fifteen months, agglutination was present in dilutions of 1 : 80 or 1 : 100.

Leishman and Harrison (1905) (5) found that in all four groups investigated by them, the rise in agglutinins commenced nine days after inoculation, and it seemed as though dosage had little to do in hastening or retarding their appearance.

Dreyer and Inman (1915) (6) found that the gradual fall in agglutinin titre, which occurs as time elapses, can be plotted in a curve. This curve is closely similar to the ordinary agglutinin curve of an inoculated experimental animal. Their results bear out Leishman's contention that, after a double dose of typhoid vaccine, an increased resistance of infection for a period up to eighteen months or two years could be proved statistically. They found that, for at least eight months after a single or double dose of typhoid vaccine, the serum of every inoculated person contained relatively large quantities of antibodies, *viz.*, agglutinins. Their results showed that the persistence of agglutinins in the blood endures for much longer periods than has usually been recognized.

Wright (1904) (7) states that it is not infrequent to find an agglutinating power in the blood of inoculated persons as long as two years after the inoculation of antityphoid vaccine.

Martin and Upjohn (1916) (8) found, on investigating the agglutination titre for *B. typhosus* of the sera of seventy-five healthy persons inoculated against typhoid seven to fourteen months previously, that two-thirds showed an agglutination titre of 1 in 200, or upwards, and in 10%, it was 1 in 800 or upwards. In addition the pooled sera of twenty-eight men, inoculated on the same day fourteen months previously, was found to give a good agglutination at 1 in 200.

Author's Experiments.—From my own experiments, recorded in Tables VI., IX. and elsewhere, it is seen—

(1) That the agglutinins usually make their first appearance on the sixth day, occasionally a day later. They were never found earlier.

(2) They rise rapidly until their maximum is attained. This usually takes place between the eighth and fourteenth days, occasionally a few days later.

(3) The maximum is usually maintained for a week or more, and then there is a gradual fall, the rate of fall becoming progressively slower as time goes on, until eventually the curve becomes practically a straight line, representing a raised base line of agglutination.

(4) When the agglutinins are slow to appear they usually do not attain a very high titre.

(5) Those cases that respond early, generally respond well.

(6) If a small dose of vaccine, *e.g.*, 250 millions, has been employed for the initial dose, the first appearance of agglutinins is occasionally a day later than if a larger dose of vaccine, *e.g.*, 500 millions, has been administered.

(7) The height to which the agglutinin curve ascends does not necessarily indicate the length of time

Table XI.—B. typhosus vaccine II. B. typhosus emulsion II.

Number	Age in Years.	Weight in Pounds.	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions
81	22	154	15.11.'16	—	Nil	21.11.'16	—	250	27.11.'16	—	Nil	29.11.'16	+ 1 in 500 120 secs. (trace)	Nil

Table XI.—B. typhosus vaccine II. B. typhosus emulsion II. (*Continued*)

Number	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions	Date.	Agglutination.	Dose in Millions
81	30.11.'16	+ 1 in 1,000 60 secs.	Nil	4.12.'16	+ 1 in 2,000 100 secs.	Nil	8.12.'16	+ 1 in 2,000 100 secs.	Nil	14.12.'16	+ 1 in 1,000 80 secs.	Nil	17.1.'17	+ 1 in 200 80 secs.	Nil

during which the titre will remain at a comparatively high level (*vide* Tables IX., X. and XI.).

The Question of the Development of a Negative Phase.

Wright (1904) (*loc. cit.*) considered the law of positive and negative phases to be a general law of immunization. Leishman and Harrison (1905) (*loc. cit.*) found no evidence of a negative phase in connexion with the protective substances in the blood after antityphoid inoculations. Bull (1915) (10) arrived at the same conclusion.

In none of the 89 sera examined by me was there any evidence to suggest that a negative phase of agglutination was produced by inoculation.

Transmission of Agglutinins by Milk.

Ehrlich was the first to demonstrate the transmission of antitoxin by milk. Working with mice, he showed that in vaccinated female mice the milk contains antitoxins, and that the antitoxins are absorbed by the alimentary canals of the offspring. Later researches showed that only very young mice are capable of assimilating antitoxin through the intestinal wall.

Vaillard (1896) (15) was able to show that even the young of other species of animals, such as the guinea-pig and the rabbit, are incapable of appropriating the antitoxins from milk by the alimentary canal.

Remlinger (1890) (16) made similar experiments with young guinea-pigs and rabbits suckled by foster mothers which had been vaccinated against *B. typhosus*. As in Vaillard's experiments, the results were negative, the milk of the foster mothers did not communicate any refractory condition to the nurselings. Remlinger also showed that when female rabbits and guinea-pigs are vaccinated during gestation, the young ones acquire, along with the immunity against *B. typhosus*, a certain agglutinative power of the blood serum. When, however, these vaccinated females suckle the progeny of non-vaccinated mothers, the agglutinative power of the milk of the foster mother never passes into the blood of the nurselings.

Widal and Sicard (1897) (17) demonstrated the same fact, that young rabbits and new-born kittens, when fed with agglutinative milk, acquired no power of agglutinating *B. typhosus*. They agreed with Ehrlich, however, that the blood serum of young mice fed with agglutinative milk did acquire the power of agglutinating *B. typhosus*. These two observers also caused an adult human to drink immunized goat's milk, which powerfully agglutinated *B. typhosus*. The blood, however, never showed the slightest agglutinative power.

Bensaude (1896) (18) and Schumacher (1901) (19) have shown that the same holds true with regard to the human infant, when suckled by a woman whose milk manifests a very considerable agglutinative property.

Talamon and Castaigne (1898) (20), in a case of enteric fever occurring four months after delivery, obtained a marked positive serum reaction from the mother's milk. The child, whilst taking the breast, gave a positive reaction, and after weaning a negative reaction. The reaction, however, reappeared four days after recommencing breast feeding. They also quote a case of the fever three months after delivery, in which the blood of the suckling did not react, although the mother's milk gave the reaction. They state that in the former case the child had enteritis, and thus explain the absorption of the agglutinin on the assumption that the agglutinating substance is not absorbed by mucous cavities unless a lesion is present.

Römer (1909) (21) states that the presence of agglutinins in milk has undoubtedly been proved. Women with typhoid fever in the early stages of lactation may have agglutinins in their milk. He states that evidence as to the transference of agglutinins from the milk to the suckling is about equally divided.

Metchnikoff (1905) (22) states that agglutinins may be demonstrated not only in the blood serum, but also in transudations and exudations, and in certain secretions, such as milk, tears and urine.

Author's Experiments.—Table XII. shows the results of tests carried out by me with the serum of a woman inoculated with typhoid vaccine and the serum of her infant son, who was fed entirely on the breast milk.

Though the doses of vaccine were small, the mother responded well so far as the blood was concerned, but on no occasion were positive results obtained from the milk, tears, urine, or saliva. The latter three were tested in their natural state. The milk was centrifuged, and the comparatively clear fluid so obtained was used in the tests. On one occasion, instead of employing the centrifuge, rennet and acetic acid were added to the milk, in order to separate the clot.

Twenty-two days after the mother's first inoculation the blood of the suckling contained no agglutinins.

Agglutinins in the Serum of Uninoculated Individuals; the Possible Cause of their Presence and the Effect of Inoculation on such Agglutinins.

Ritchie (1916) (23) found that in the case of medical students, laboratory workers, and the hospital class of the population, a larger proportion of these sera agglutinate in higher dilutions than do those of normal members of the population.

Collins (1908) (24) found that agglutinins were produced in the animal body by the inoculation of substances other than products of bacterial origin. In particular, she found that some ferments such as yeast cells, some products of metabolism, such as nuclein (in the form of nucleo-protein from the pancreas), lecithin and proteoses (from egg), and some products of putrefaction, such as ethyl mercapatan in 1% solution, when injected subcutaneously in repeated doses, stimulated the production of some kinds of agglutinins (including typhoid agglutinins).

Wright (1904) (*loc. cit.*) states that the results of his experiments on the oral administration of typhoid vaccine, suggest that the phenomena of immunization by acclimatization, which is so strikingly emphasized by the statistical records of the British Army in India, may possibly be the result of an occasional ingestion of the typhoid bacillus into the alimentary canal.

Latham (1910) (*loc. cit.*) says that there are certain grounds for believing that part of the immunity many of us enjoy against certain infections, is due

to small doses of the appropriate vaccine administered in this way by a beneficient Providence.

Author's Experiments.—Of the eighty-nine sera investigated in detail by me, seven gave positive results before the vaccine was administered. In three of these cases (No. 44, Table IV., No. 77, Table XI., and No. 82, Table XIII.) the typhoid agglutinins present were undoubtedly due to previous inoculation with typhoid vaccine. The feeble agglutinin response of these cases is recorded later.

A fourth individual (No. 71, Table VII.) was inoculated with typhoid vaccine eight years previously in the Royal Army Medical Corps. The interval is so long that it hardly seems justifiable to attribute the typhoid agglutinins in his serum to previous typhoid inoculation. He seemed likely to respond moderately well, but unfortunately was only kept under observation for seven days.

In the remaining three persons there was no history of typhoid fever or previous inoculation with typhoid vaccine. The effect of inoculation on the agglutinins in their sera is interesting.

No. 13 (Table II.) left camp immediately after the first injection, and so is an unknown quantity in this respect.

No. 23 (Table II.) responded well. Only two of the seventeen other members of this series, who were tested seven days after the second injection, agglutinated in as high a dilution as he.

No. 75 (Table X.) reacted markedly, and the agglutination titre of his serum remained at a high level for a very long time. It is interesting to note that, in this case, the agglutinin response to reinoculation ten weeks later (Table XIX), though definite, was less marked than the response of the first inoculation.

The marked agglutinin response to inoculation in Nos. 23 and 75, as compared to the feeble response in Nos. 44, 77 and 82, suggests that in the former the agglutinins originally present in the serum may have been called forth by a non-bacterial antigen, such as those used in Collins' investigations. The comparatively poor response of No, 75, to reinoculation (Table XIX.) with the bacterial antigen, seems to support this theory.

In uninoculated persons, the highest dilution of serum to agglutinate a typhoid emulsion was 1 in 20.

The presence of typhoid agglutinins in the serum of uninoculated persons would seem to be due to one of the following causes:—

(1) Previous infection by *B. typhosus* with the production of typhoid agglutinins.

Table XII.—B. typhosus vaccine II. B. typhosus emulsion II.

Number	Age in Years.	Weight in Pounds.	Date.	Agglutination. Blood.	Milk.	Urine.	Tears.	Dose in Millions	Date.	Agglutination. Blood.	Milk.	Urine.	Saliva.	Dose in Millions
79	26	140	6.11.'16	—	—			125	13.11.'16	—	—			250
			20.11.'16	+ 1 in 2,000 50 secs.	—			Nil	27.11.'16	+ 1 in 2,000 60 secs.	—			Nil
			2.12.'16	+ 1 in 2,000 80 secs.	—		—	Nil	11.12.'16	—	—	—	—	Nil
			14.12.'16	+ 1 in 2,000 70 secs.				Nil						

Number.	Age in Months.	Weight in Pounds.	Date.	Agglutination.	Dose in Millions.	Date.	Agglutination.	Dose in Millions.
80	5	17	30.10.'16	—	Nil	28.11.'16	—	Nil

(2) Previous infection by paratyphoid bacilli, or other organisms closely allied to *B. typhosus* with the production of typhoid co-agglutinins.

(3) Ingestion of typhoid bacilli by the alimentary tract with subsequent development of typhoid agglutinins.

On analogy, two other possible causes are:—

(4) Ingestion by the alimentary tract of paratyphoid or other bacilli closely allied to *B. typhosus*, with subsequent development of typhoid co-agglutinins.

(5) Ingestion or absorption from the alimentary tract of non-bacterial substances, such as those injected hypodermically in Collins' investigations.

(*To be continued*).

THE PRACTICE OF ANÆSTHETICS*

(A Condensed Lecture, from which the Physio-pathology of anæsthetics has been deleted.)

By **E. H. Embley, M.D.,**
Consulting Anaesthetist to the Melbourne Hospital

(*Continued from page* 391.)

Severe Wounds.—If there be intra-thoracic hæmorrhage from wounds of the chest, neither nitrous oxide nor ether is allowable. If local anæsthesia cannot be used, then chloroform and oxygen sequence is the only available anæsthetic. Wounds of the abdomen are very prone to be followed by bronchitis, more especially after open ether. Warmed ether vapour is preferable. When much loss of blood has occurred in any case, spinal anæsthesia and chloroform are both dangerous. Septic cases do well with nitrous oxide or with ether, not with chloroform.

After Treatment.

The patient should not be left till signs of recovery are obvious to the friends. In hospital the

case may be handed over to the nurse in charge as soon as a brisk corneal reflex has returned. Warmth is most essential in all patients showing signs of shock. In severe shock the patient should be turned into the Trendelenburg position as soon as possible. Very stout people cannot be retained in that position very long, owing to respiratory embarrassment.

No nourishment should be given till the lapse of three or four hours, unless it be asked for. The first given should be liquid. Protracted post-operative vomiting is not common unless the operation has been a prolonged one, unless the patient has not been properly prepared, or unless much mucus or saliva has been swallowed. For facilitating the escape of vomited matter the head or the whole body should be turned well on one side. If vomiting be persistent, 150 to 180 c.cm. of hot water, or hot coffee or of hot brandy and water may arrest it. Washing out the stomach is sometimes resorted to with success. Swallowing cracked ice is also successful. In other cases champagne internally, with the ice bag on the epigastrium, is a success. The body heat should be preserved meanwhile.

Chloretone in 0.6 gramme doses, given an hour before starting the administration of the anæsthetic, is regarded as a preventive of post-operative vomiting. In most cases, however, the pre-anæsthetic narcosis prevents it. In rare instances of idosyncrasy, morphine intensifies the liability to vomiting. This happens in persons prone to sickness from morphine under any circumstances. Sucking a slice of lemon will remove the disagreeable taste which follows narcosis. The smell of ether is agreeably masked by a strong perfume, such as the essence of orange, kept in proximity to the nose after recovery. If adenoids or nasal stenosis impair lung ventilation the mouth should be propped open. The slow respiration sometimes caused by pre-narcosis delays elimination and recovery. Acidosis or delayed chloroform poisoning is rare in Australia. Alkaline treatment offers the best prospects of recovery.

General Anæsthesia by Intravenous Infusion.

The drugs employed for this purpose are ether, paraldehyde, alcohol, hedonal and other soporifics. Hedonal has been most used. The anæsthetic agent dissolved in isotonic salt solution is run continuously into a vein which has been exposed and in which a cannula has been tied by the aid of a local anæsthetic. The solution heated to 40°-43° C. is maintained in a warming apparatus at this temperature. When a sufficiently deep level of anæsthesia has been induced the flow is reduced by clamping down to drop rate, the flow being maintained to prevent clotting. Ordinary care is needed to prevent air entering. A preliminary injection for pre-narcosis is necessary.

Ether.—The concentration of the solution employed is 5 or 10 %, the latter only in refractory cases and those in whom it is undesirable to infuse much fluid. The greater the percentage strength of the solution used the greater is the probability of hæmoglobinuria occurring. Anæsthesia is induced in from 2½ to 3 minutes, and without excitement. The same care is demanded and the same guides employed as in ether narcosis in the usual way. The after effects are said to be less than those by the inhalational methods.

Paraldehyde.—Employed in the same manner as ether. This hypnotic has been used with considerable success for small operations.

Alcohol.—In 20% solution of 90% alcohol. This agent has been successfully used in all classes of operation. About 600 c.cm. of the solution is the quantity found to be sufficient for an operation extending over an hour. It has not had an extended trial.

Hedonal.—This is used in 0.75% concentration. Induction is effected in from 5 to 10 minutes. The average quantity of such solution employed is 500 c.cm. Relaxation of the muscular system is very complete, and the narcosis is profound. Only a slight fall of blood pressure occurs. The lung ventilation is minimal, so that any interference with respiration is rapidly denoted by the appearance of cyanosis. Care should be exercised in the selection of cases, especially in avoiding the asthenic and those with diminished respiratory efficiency. The recovery is attended by prolonged sleep. This form of securing anæsthesia is introduced for operations about the mouth, tongue, larynx, etc. The same guides are used as for the inhalational methods. The death rate from narcosis by this method in not reassuring. Veronal, chloral and isopral are used in the same manner.

The Intra-muscular Method of Etherization.

By this method undiluted ether is injected into the buttocks or shoulders. Failures are frequent, and the after pain may be severe at the site of injection. It has not received much attention.

Local Anæsthesia.

The chemicals now in use for effecting local anæsthesia are cocaine, β eucaine, novocaine, stovaine, tropacocaine, alypin, and a mixture of quinine hydrochloride and urea. Of these cocaine, novocaine, stovaine, and quinine and urea are the principal.

Novocaine is used more frequently than the other substances because it can be sterilized and because it is less toxic and less irritating than the others and just as efficient. Stovaine is limited to spinal anæsthesia. Cocaine is used in minor cases, where very little of the anæsthetic is required, and for surface anæsthesia. Urea and quinine combination is used also for infiltration anæsthesia, but to a very much less extent than novocaine. Stovaine is the most irritating, and cocaine cannot be sterilized very satisfactorily by heat.

Novocaine is commonly used in two concentrations, that is, as 0.2% and 2% solution, combined with adrenalin 1 in 100,000. The adrenalin enhances the efficiency of the anæsthetic agent by delaying its absorption. It also facilitates the operative precedure by rendering the field relatively bloodless. It should be added just before use, as it rapidly decomposes when in oxygen containing fluids. The preparation is made up with the isotonic salt solution. It should be sterilized by boiling before the adrenalin is added.

The 2% solution is used when small operations are

being done, such as for infiltrating the skin in the line of the incision. The 0.2% solution is used for infiltration and nerve blocking. As much as 100 c.cm of this is frequently employed. The skin is first infiltrated along the line of incision. In this procedure the first needle prick alone should be felt, as the subsequent pricks are made at the end of the infiltrated area. For infiltrating nerve trunks it is well to remember that adjacent nerve trunks generally overlap at their terminals. The full effect is attained in about 20 minutes.

When quinine and urea are used a concentration of 0.25% solution is usually sufficient. Concentrations of 1% and over are apt to be followed by necrosis. This is also apt to occur when adrenalin is used in excess. Both of these substances impair the vitality of tissues.

Spinal Anæsthesia.

For this form of inducing anæsthesia novocaine is generally used instead of stovaine, which was invariably used a few years ago. Its use is limited, being confined to cases in which the usual methods of anæsthesia cannot be employed. Adrenalin and strychnine are no longer employed with the novocaine.

Chaput's solution is 10% each of sodium chloride and of stovaine (or novocaine). Barker replaced the sodium chloride of this solution by 5% dextrine. Both of these are heavy solutions, so that injected with the patient lying on the side to be operated upon, it falls in contact with the nerve roots of that side and is supposed thereby to produce greater effect. The greatly disturbed balance of osmotic tensions thereby occasioned must render such an assumption rather doubtful. The method of dissolving 0.06 gramme of novocaine in about 20 drops of cerebro-spinal fluid as it is withdrawn and returning it, seems to result in equally efficient anæsthesia. The novocaine and vessel are sterilized by heat in this as in the case of the denser solutions mentioned. In using Chaput's or Barker's solution 0.6 c.cm. is injected and the needle left *in situ*, so that if the part is not anæsthetic in seven minutes a further 0.3 c.cm. is injected, and repeated, if necessary, in a further seven minutes. These additional injections, however, are rarely required. The skin should be sterilized at the site of the injection, which is made between the second and third or third and fourth spinous processes. The fourth lumbar spine is on a level with the two iliac crests. The cord terminates opposite the second lumbar body, so that a needle inserted in the second or third space does not injure it. The second space is the easiest to perforate, and is the least painful.

The needle of the Barker's syringe, detached and containing the stylet, is inserted perpendicularly and in the midline. It is pushed on till it is felt to have passed some resistance. It should now be pushed a little further and the stylet removed. The cerebro-spinal fluid should run out freely through the needle. If this does not occur, but the flow is dripping, the needle has only partly entered the canal. If the injection were now made some of the solution would escape into the tissues and the anæsthesia would be imperfect. The stylet should thereupon be re-inserted and the needle pushed further in till the fluid does run freely. It is advisable to allow as much cerebro-spinal fluid to escape as the volume of the fluid to be injected. Now the syringe is attached to the needle and the injection made.

In making the injection the patient may sit on the side of the table with his back bent, or he may lie on his side—that side which is to be operated upon. When anæsthesia is complete he is rolled into the dorsal position.

As a rule the onset of anæsthesia is very rapid, testing being unnecessary. The anæsthesia lasts from 23 to 120 minutes, the average being 60 minutes. Without elevating the trunk the anæsthesia usually extends to the fourth rib. By elevation this can be carried to a considerably higher level. This, however, is attended by increased risk of respiratory paralysis, and is generally disapproved.

Advantages of Spinal Anæsthesia.—Its chief advantage is in nerve blocking and thereby lessening shock. It may be used in phthisis, bronchitis, nephritis, alcoholic and cardiac cases.

The disadvantages are the occasionally syncopal drops in blood pressure which occur, especially after recent hæmorrhage or in conditions of shock. Such drops in blood pressure are very alarming and sometimes fatal. Respiratory paralysis occasionally occurs, especially when the height of the anæsthesia is raised by elevation of the trunk. It is unsuitable for operations above the diaphragm, upon the gall bladder or upon the abdomen in cases of general peritonitis, unless inhalational anæsthesia is also induced. It is occasionally followed by some muscle paralysis. When this form of anæsthesia is used for children, the skin at the site of injection should be anæsthetized by novocaine before puncturing.

Caudal Anæsthesia.

This method differs from spinal anæsthesia in that the novocaine solution is injected, under the same conditions into the sacral canal through the sacral hiatus just above the coccyx. Weaker solutions in larger volume are recommended as being more satisfactory. Of 0.5% solution of novocaine 40 to 90 c.cm. are used, the larger dose being used for the more severe operations, such as prostatectomy.

The method is used for operations upon the pelvis, perineum and thereabout. The skin over the hypogastrium needs local infiltration anæsthesia with novocaine in the operation for opening the bladder. It has been used for anæsthesia in labour.

Local Anæsthesia by Intravenous Injection.

This is only possible for operations on the arm or leg. After the application of the Esmarch bandage, a rubber tube or bandage is firmly bound around the limb above the Esmarch one, and tightly enough to stop the arterial circulation. The Esmarch bandage is now removed and another indiarubber bandage is put round the limb at the lower end of the operation field, so that this area is included between the two bandages. The lower bandage is made tight enough to prevent diffusion of the anæsthetic fluid below it. A large vein is now exposed under local anæsthesia and a cannula secured in it. To the cannula is attached a 100 c.cm. syringe containing the anæsthetic

solution. This fluid is then injected till the limb becomes swollen and a dusky white colour. Gentle massage is used to distribute the injected fluid. The part to be operated upon is anæsthetic in from 5 to 15 minutes. The part below the lower ligature is anæsthetic in from 15 to 30 minutes by nerve blocking. In the leg, as much as 200 c.cm. of 0.5% novocaine solution is used as a maximum. For the knee area, as much as 150 c.cm. can be used, and for the adult elbow, from 50 to 75 c.cm.

It is important that the limb be emptied of blood by the Esmarch bandaging before the injection is made.

This method is advocated for cases unsuited for general inhalation anæsthesia, such as in operations on diabetics, in cases of great debility, etc. The results are usually very satisfactory.

Anæsthesia by Intra-arterial Injection.

This is effected by injecting, by means of a fine hypodermic needle, a 0.5% novocaine solution directly into the exposed artery. An Esmarch bandage is applied to the whole limb, before the injection is made.

Anæsthesia by Cataphoresis.

A 10% solution of cocaine with adrenalin is used to saturate a pad of gauze wrapped around the positive pole of a battery of 10 to 20 dry cells, and placed over the part to be operated. The negative terminal is placed somewhere adjacent. A rheostat is used and a current passed such as can easily be borne. It has been used in operations on piles, moles, ævi, superficial epithelioma, etc.

Reports of Cases.

THE ENCEPHALITIC FORM OF ACUTE POLIOMYELITIS.

By **Clive T. Stephen, M.B., Ch.B.,**
Elmore, Victoria.

C.M., *aet.* 2½ years, was in perfect health and playing until midday ————, when she "fell down and took a fit." I saw the child at 2 p.m. On examination I found the child in coma. Her temperature was 39.2° C., and her pulse-rate 130. The left arm and leg presented a flaccid paresis, and there were clonic movements of the right arm and leg and the face at intervals of about three seconds, occasionally becoming tonic and lasting for some two or three seconds. There was conjugate deviation of eyes to the left, with nystagmic movements. The twitchings of the limb and face were simultaneous. The pupils were equal, reacted well, and were of normal size. I could not elicit definite plantar reflexes. The left knee-jerk was absent, and the left arm-jerks were also absent. Kernig's sign was not obtainable. There was no head retraction. The face was very cyanosed. This was relieved by clearing the airway. The mouth was gagged, and a stomach tube passed. The stomach was washed out and a full dose of castor oil left in. Chloroform in small amounts quietened the movements, which recurred at lengthening intervals, and ceased after about one half hour, but returned every quarter hour or so, and lasted for some five to ten minutes. The right pupil was then observed to be dilated, and remained so until death, without further variation. This condition of recurrent clonic spasms on the right side and left half of the face, with coma, continued for some hours, with the difference that the clonic spasms occasionally involved the left side, which had regained its tonus slightly. About this time several large, loose, blackish, offensive motions were passed. I was obliged to leave the patient for two hours, and was informed that the condition had persisted as before during my absence. The intervals between the convulsive seizures had become longer, and for a short period the child seemed almost to regain consciousness. During this period several unintelligible utterances or cries were made. Convulsive seizures returned, and now the eyes deviated to the right. The seizures were of greater severity. Previously bromide had been given by stomach tube. Chloroform controlled things slightly. About 11 p.m. the epilepsy was of Jacksonian type, and practically continuous. About 1 a.m. there was head retraction, and the convulsive seizures were now tonic, with opisthotonos, lasting ten to fifteen seconds, and then relaxing, to be repeated. The tonicity of the spasms increased to about one minute. The pulse was now becoming thready, but regular and 180. The respirations were shallow and very rapid, reaching 90 per minute, with short periods of apnœa. Death occurred about 4 a.m., about 16 hours from the onset of the illness. Blood pressure was measured twice; when the pupillary dilatation was noticed, and was then 120 to 125 mm. Some hours later it dropped to 100 to 105. I did not perform lumbar puncture; unfortunately, I was absent from home, and did not have a needle. A post-mortem was not obtainable. I signed the certificate as polio-encephalitis. The case in the early stages was not a little puzzling, and throughout was extremely interesting.

REPORT ON THE USE OF TETHELIN.

By **Helen M. Mayo, M.B., B.S. (Adel.),**
Adelaide.

The tethelin in question was isolated by Professor T. Brailsford Robertson, of Berkeley University, from the pituitary gland, and was supplied to me by the courtesy of Professor Sir Edward Stirling, of Adelaide. The doses given at first were much smaller than those recommended, as the patient was extremely frail. No ill-effects were observed following the administration, except a slight tenderness of the arm at the point of injection.

Mrs. B., *aet.* 54 years, a diabetic of at least ten years' standing, had an electrical burn of her left leg on June 29, 1917. The burn was deep, though of small area, and every effort was made to get it healed, without success. On November 9 the burn was about the size of a shilling, covered with granulation tissue, forming a button-like elevation and surrounded by surface blisters, due to the accidental application of some carbolic by the patient. The ulcer was very painful, and caused much distress. It was on this date that the administration of tethelin was begun, and it was given as follows:—

On November 9 100 mgrs. of tethelin were dissolved, 37.5 injected into the arm, and 62.5 mgrs. applied to the ulcer in solution.

On November 10 50 mgrs. were injected into the left arm, and 50 mgrs. applied to the leg in solution.

On November 11 the carbolic blisters were much better. The whitish edge of the ulcer was more marked, and there was a general improvement. Fifty milligrams were injected, and the same amount was applied to the leg.

On November 12 100 mgrs. were injected into the arm. Normal saline solution was applied to the leg.

On November 13 100 mgrs. were injected into the arm, and saline solution to the leg. The ulcer was covered with a layer of white epithelium, completely obscuring the granulation, but with a crack in the centre.

On November 18, 100 mgrs. of tethelin were injected. Healing was practically complete, and no more tethelin was administered, but the progress continued. The epithelium covering the surface became tougher and then the button-like elevation gradually disappeared, leaving a smooth, slightly discoloured scar.

No further trouble was experienced with the leg, but the patient died on March 10, 1918, insanity and then coma developing a week or two before death.

Reviews.

JEWISH CHILD LIFE.

The task of collecting information from records spread over a period of nearly four thousand years requires patience, literary knowledge and discernment. When the in-

formation sought is of a highly specialized nature, the student must possess other attributes and must be a master of the branch of knowledge under investigation. A task of this kind has been undertaken by Dr. W. M. Feldman, and the result, a book dealing with the Jewish child,[1] may be regarded as an unqualified success. Dr. Feldman's knowledge of the physiology of infants and children and of general hygiene have stood him in good stead in his search for fragments in ancient and mediæval literature with which he could build up a relatively complete story. The book is full of interest from the first to the last chapter, and in certain aspects of hebraic hygiene it opens out new views. It has one blemish; a wordy, florid introduction by Sir James Crichton-Browne has been added—for no obvious purpose. The author is not content to look for guidance concerning the care of the Jewish child from the moment of conception; he traces the care bestowed by the Jews on prospective children, and begins his study with a consideration of the ante-conceptional or germinal stage. He adduced a great mass of evidence to prove the value attached by the Jews, from the days of Abraham, to the duty of men and women to procreate. Much of the instruction aiming at the birth of healthy, strong progeny is obviously invented by a people at an age when the laws of physiology were but imperfectly understood. The records demonstrate the absence of anything approaching a divine guidance in connexion with these matters. Moreover, his researches have revealed how convention has led to the elaboration of an ethical code which, after passing through a variety of stages and modifications, has arrived at the form accepted to-day by the so-called western civilization. Some of the doctrines which arose at an early age, are wholly opposed to fact, and would seem to have been based, as are so many religious doctrines, on the desire of man to mould his own destinies. An example of this is the doctrine of telegony, by which is meant the alleged influence of a previous husband upon the progeny produced by a second one from the same mother. The author becomes fascinatingly interesting when dealing with philosophical speculations concerning the embryo, and when he endeavours to introduce modern methods of investigating problems in heredity. The information concerning pregnancy and parturition, as revealed by the Biblical and Talmudic writings, the superstitions and customs connected with early child life, and the curious precautionary measures adopted for the safety of mother and child, all find adequate treatment. The author has a happy knack of infusing a light vein through his writing by citing queer stories and remarkable quotations. There is much to be learnt from the book, although the student must be wary, lest he draws unwarranted conclusions or attributes more prevision to that wonderful race than history is able to verify. Even the pædagogue of to-day will find in this publication much that would improve his methods. Lastly, the present-day Australian child would do well to emulate the children of the ancient Jews in their respect and obedience to their parents and elders. All this and much more can be learned from the book of Dr. Feldman.

Public Health.

NEW SOUTH WALES.

The following notifications have been received by the Department of Public Health, New South Wales, during the week ending May 4, 1918:—

	Metropolitan Combined District. Cs.	Dths.	Hunter River Combined District. Cs.	Dths.	Rest of State. Cs.	Dths.	Total. Cs.	Dths.
Enteric Fever	5	1	1	0	4	0	10	1
Scarlatina	19	0	0	0	15	0	34	0
Diphtheria	79	2	20	1	70	0	163	3
*Pul. Tuberculosis	17	5	0	0	0	1	17	6
C'bro-Spl. Menin.	0	0	1	1	0	0	1	1
Poliomyelitis	0	0	0	0	1	0	1	0

* Notifiable only in the Metropolitan and Hunter River Districts, and, since October 2, 1916, in the Blue Mountain Shire and Katoomba Municipality.

[1] The Jewish child, Its History, Folklore, Biology, and Sociology, by W. M. Feldman, M.B., B.S., with an Introduction by Sir James Crichton-Browne, M.D., D.Sc., LL.D., F.R.S.; 1917. London: Baillière, Tindall & Cox. Demy 8vo., pp. 453, with two Plates and 19 Illustrations. Price, 10s. 6d. net.

VICTORIA.

The following notifications have been received by the Department of Public Health, Victoria, during the week ending May 5, 1918:—

	Metropolitan. Cs.	Dths.	Rest of State. Cs.	Dths.	Total. Cs.	Dths.
Enteric Fever	0	1	5	0	5	1
Scarlatina	25	0	24	0	49	0
Diphtheria	104	3	48	1	152	4
Pulmon. Tuberculosis	18	6	8	5	26	11
C'bro-spinal Meningitis	1	—	0	—	1	—
Poliomyelitis	4	—	3	—	7	—

QUEENSLAND.

The following notifications have been received by the Department of Public Health, Queensland, during the week ending May 4, 1918:—

Disease.	No. of Cases.
Enteric Fever	5
Scarlatina	6
Diphtheria	49
Pulmonary Tuberculosis	7
Puerperal Fever	1
Cerebro-spinal Meningitis	5
Poliomyelitis	1
Erysipelas	2

WESTERN AUSTRALIA.

The following notifications have been received by the Department of Public Health Western Australia, during the week ending April 27, 1918:—

	Metropolitan. Cases.	Rest of State. Cases.	Totals. Cases.
Enteric Fever	1	0	1
Scarlatina	19	4	23
Diphtheria	20	22	42
Pulmonary Tuberculosis	4	1	5
Cellulitis	0	1	1

SOUTH AUSTRALIA.

The following notifications have been received by the Central Board of Health, Adelaide, during the week ending May 4, 1918:—

	Adelaide. Cs.	Dths.	Rest of State. Cs.	Dths.	Totals. Cs.	Dths.
Enteric Fever	0	0	3	0	3	0
Scarlatina	0	0	8	0	8	0
Diphtheria	1	0	26	0	27	0
Pulmonary Tuberculosis	2	0	10	0	12	0
C'bro-Spl. Meningitis	1	0	0	0	1	0
Erysipelas	0	0	3	0	3	0
Morbilli	0	0	1	0	1	0
Pertussis	0	0	2	0	2	0

THE LODGE DIFFICULTY IN VICTORIA.

His Honour Judge Wasley, who has been appointed Royal Commissioner to enquire into the causes of dispute between the friendly societies and their late medical officers in Victoria, opened the enquiry on May 8, 1918, at the Insolvency Court, Melbourne. Mr. Owen Dixson appeared on behalf of the Victorian Branch of the British Medical Association, and Mr. S. Mauger appeared for the Friendly Societies' Association.

Mr. Mauger protested against the appearance of counsel. After some discussion, in the course of which His Honour made it quite clear that he would not act as solicitor as well as judge, but that he would expect that each party would make suggestions as to the course they intended to pursue in the conduct of their respective cases, he decided that he would admit counsel. He favoured this on the ground that they would conduct their cases much better than laymen, and that there would be a consequent saving of time. It was determined that time should be allowed the friendly societies and the Victorian Branch of the British Medical Association to prepare their cases.

The Medical Journal of Australia.

SATURDAY, MAY 18, 1918.

An Obligation to Absent Colleagues.

The Federal Committee of the British Medical Association in Australia sent a request last February to the six Branches to consider how a fund could be raised for the purpose of affording assistance to the dependants of those members of the medical profession who become disabled, or who are killed, while on active service, and to the disabled members themselves. The suggestion was brought up by Dr. R. H. J. Fetherston, as representative of the Victorian Branch. The schemes should now be formulated, in order that the details may be thoroughly considered and thought out before the Federal Committee meets in July to consider this and other matters. This subject has been brought up many times, and has consistently received the approval of the members of the Branches in the abstract. Nothing practical has yet been decided, probably because considerable difficulty has been experienced in ascertaining exactly what is needed. The feeling that the sum of money required may be large has no doubt contributed to the hesitation in the acceptance of a basis for a scheme. We venture to express the opinion that the greater number of the difficulties will disappear, if the facts are reviewed and the ordinary principles of economy applied.

Assistance will not be needed by the dependants of every member of the Australian Army Medical Corps who is disabled or killed on active service. The fund would be required for young men with dependants, and especially for those who have not yet accumulated sufficient money to provide for their relatives, either by investment or by insurance. It will be realized that many of the medical practitioners who have left Australia for service abroad, have been detailed for duty at base hospitals, either in Egypt or in England, in places of safety, and have served their country faithfully, and to great advantage, without having been exposed to a risk materially greater than that ordinarily run by those who come in contact with disease. The history of the three and three-quarter years of wartime has taught us that these men return to their practices without grave disability. They have made great sacrifices. The majority have suffered large pecuniary loss by leaving their practices, and many have experienced difficulty in re-instating themselves on their return. While the value of the services of these men is recognized, and their disinterestedness applauded, it is obvious that the fund proposed can have no reference to them. Similarly, the senior men who serve as transport or hospital ship medical officers will not need any assistance to put them on their feet again. The men who serve within the danger zone or in the Navy are in a very different category. It is true that some of these are financially well situated, and make provision for their dependants before they leave the shores of Australia. We may estimate that the number of medical practitioners who have gone to the war, either in the Australian Army Medical Corps or in the Royal Australian Navy, up to the present time scarcely exceeds 1,000. In addition, over a hundred have joined the Royal Army Medical Corps. There are at present 722 names of medical men serving as medical officers in the Australian Imperial Force, including 82 who are attached to regiments, 150 attached to field ambulances, 22 to casualty clearing stations, and 110 to hospitals. In the Royal Australian Navy there are 17 surgeons on the sea-going list. For our persent purpose, it is necessary to arrive at an estimate of the risk run by these men. The number of killed already exceeds 60. We have no accurate figures of the number who have received incapacitating wounds. From the records available to us, it would seem as if the disablement rate is relatively low, while the mortality is high among the men serving in the field. The sickness rate has been very considerable, but in the large majority complete recovery has ensued. Assuming that the risk of disablement or death is run continuously by some 500 men, and that of these less than 100 suffer injury to life, limb or health during any one year, we feel justified in recommending that provision should be made for half that

number, on the further assumption that this will correspond to the proportion of men without means and with dependants. To take out insurance policies for the total number would obviously be extravagant, since the premiums would amount to a sum considerably larger than the total estimated risk.

In the next place, it is proposed to lend financial assistance to men who have to start afresh on their return. Some of these men are suffering from the effects of active service, while others find themselves hampered because they have no reserve, enabling them to buy a practice or to wait. We feel sure that neither these men, nor those whose disability renders them temporarily or permanently unfit to engage in ordinary strenuous practice, would accept assistance as a gift. They would appreciate the provision of loans, and would take advantage of it. In our issue of February 9, 1918, we published an ingenious scheme, evolved by an anonymous correspondent. The fund proposed, if properly administered, should suffice for the purpose under consideration. It is suggested that each member of the British Medical Association in Australia be asked to contribute £15 a year for three years. Many will, no doubt, give larger sums; some will not be able to give as much. If two thousand medical practitioners in the Commonwealth would contribute this amount on an average for the three years, the fund at its inception would be large enough to place £300 at the disposal of one hundred men, and the interest payable would provide £100 a year to fifteen disabled men, or the widows of men who had been killed. In the second year, the amount at the disposal of those managing the fund would be more than sufficient for the immediate needs, and by the third year, the capital of £90,000 should afford all the relief that the medical profession is likely to be called upon to extend to their own members, arising from the eventualities of the war.

TEMPERAMENT.

Physiology teaches us concerning the functions of our bodies, and affords an explanation for each process effected in health. It remains as silent as the tomb concerning the true character of the individual. Psychology aims at an accurate estimate of mental processes, but fails to reflect anything concerning the innermost characteristics of the man. It is vain to endeavour to fathom the temperament of a man by recording his reaction time, his muscular sense, or the acuity of his perception. In ordinary circumstances, a correct estimate of a man's temperament may not be a matter of vital importance; in war-time, faulty judgement in this respect means waste and national loss. The importance of having regard to this attribute has been brought prominently to the mind of the medical profession through the military air service. On March 11, 1918, Surgeon H. Graeme Anderson, R.N., opened the first discussion ever held by a medical society in England on aviation. His address has been published in *The Lancet*, of March 16, 1918. The subject chosen by Surgeon Graeme Anderson was the selection of candidates for the Air Service. He enumerates the various disqualifying defects, and deals in some detail with the methods of examination needed for the purpose of discovering any disability that would render a man of small use as an aviator, or that would entail an unjustifiable risk to the man, were he permitted to enter the service. But in addition to all the measurable qualities and defects, he attaches almost supreme importance to the proper temperament of the man for this special class of work. He is forced to admit that it is often impossible to anticipate how a man will behave under trying circumstances, and gives instances of exceptions to the general rule that physically strong, healthy, athletic and courageous young men make the best aviators. At present, the medical profession in Australia has not been called upon to guide the military authorities in the selection of men for aerial service, although the number trained is by no means small. In view of the fact that the value of the services of a medical practitioner in this connexion must depend very largely on the amount of careful study he has given to this complex subject, it would be eminently advisable if steps were taken at once to enlist the sympathies and to inaugurate the essential training of some young practitioners for this purpose. Surgeon Graeme Anderson has pointed out that the surgeon detailed for the duty of examining candidates for the air service must live with his men,

must fly with them, must work with them, and must play with them. The subject is much wider than it would appear at first sight. It is apparent to everyone that certain mental, personal qualities are essential for an ideal airman. The same principle holds good for every other important service. There has been no attempt in the past to make a well-founded selection of recruits for special duties in the Army. A haphazard utilization of men for all purposes connected with warfare must lead to the employment of men in positions to which they are ill-suited, and the failure to strengthen the power of our forces by ignoring special capabilities or special temperaments. No doubt the military authority, like the great mass of people, believe that there is no need for any primary selection, and that the general deportment and type of man will reflect to a casual observer his type of character. That this is quite untrustworthy is proved by the experience of every man who has been at the front. Men who were regarded as fine, manly, fearless and generous characters have proved themselves, on occasions, to be cowards at heart and grasping egotists. Boys who have shirked at football, who have stuck to their books and avoided sport, who have shown no "spirit" at school, have given up their last drop of water to a comrade, and have faced the most devastating fire at the front with a courage braced to meet any eventuality. The true value of the man displays itself in the face of the gravest dangers and in the extremest emergencies. There are many whose temperament renders them unfit for some forms of duty, but who are eminently fitted for another set of tasks. Not every medical practitioner would be able to divine the real temperament of a recruit, but with patience, grafted on a *penchant* for this kind of psychological study, and prolonged living together with the men, valuable guidance could be given to the military authority. To command efficiency in an army, not a single man should be employed in a position to which he is unsuited, either by training or by temperament.

THE RED CROSS APPEAL.

At a recent meeting of the Council of the Victorian Branch of the British Medical Association, it was suggested that an organized effort should be made in support of the Australian Red Cross Appeal. The Council requested Dr. W. Ernest Jones to take up the matter in Victoria. Enquiry has elicited the fact that many members of the medical profession in Victoria have already contributed to the Society. In has, therefore, been decided that, for the present, no direct appeal will be made to medical practitioners until it is seen whether the response is worthy of the medical profession or not. It is scarcely necessary to remind our readers of the splendid activity of the Red Cross Society. Everyone is aware of the excellent organization of this Society and of its importance to the Empire, as well as to the individual soldiers fighting for the Empire. The Australian Division has acquitted itself magnificently, and is certainly deserving of our utmost support. We are, therefore, confident that those members of the profession in Victoria and elsewhere who have not yet sent in their contributions, will do so in response to this appeal. Experience teaches us that when medical practitioners put their hands in their pockets for a good cause, generosity governs the results rather than reason. No better cause than this one has ever needed our support. It is our intention to publish the lists of contributions from medical practitioners.

THE GROWTH OF TUMOURS.

Clinical observations have demonstrated that human tumours often increase in weight while the body of the host wastes. Emaciation is a characteristic sign of the presence of a carcinoma or a sarcoma. Little information has, however, been obtained on the conditions which govern the growth of a neoplasm. It has, indeed, been thought that there is no limitation of the power of a tumour to increase in size. The nutrition of the tissues of the animal body has been shown in recent years to depend on, at least, five factors. The food must yield a sufficient number of heat units to supply the body with the necessary potential energy. Nitrogen must be given in quantity and combination adequate for the repair and construction of the tissues. Certain amino-acids, which cannot be synthetized in the animal organism, must be administered in needful amount. The diet must contain inorganic constituents capable of satisfying the mineral requirements of the animal. The two accessory substances promoting growth, and known as the water-soluble and fat soluble vitamines, must be present. An investigation has been completed by J. C. Drummond,[1] in the Cancer Hospital Research Institute, London, on the effect of these factors on the growth of tumours.

Sarcomatous tumours have been grafted into white rats, of the species *Mus norvegicus*. The sarcoma, employed in most of the experiments, has been a spindle-celled neoplasm, which showed little tendency to central degeneration, though some experiments have been carried out with a round-celled variety prone to central necrosis. The rats have been fed upon a variety of diets, while the weights of the rats have been measured, and the

[1] *Biochemical Journal*, Vol. XI., p. 325, December, 1917.

sizes of the tumours recorded. Attention has been directed to the effects of low content of protein in the diet, of poor nutritive qualities in the proteins supplied, of the absence of indispensable amino-acids from the diet, and of the absence of the two vitamines. The results show conclusively that the tumours continue to grow, although the host is quite unable to increase in weight on the diet supplied. The tumour will increase even while the host loses weight. The growth of the tumour continues as long as the tissues of the host can supply to the tumour the missing units in the diet. When the host can no longer make good the deficiencies in the diet by drawing on the substances stored in the tissues, the rate of tissue proliferation in the tumour decreases. This stage is reached comparatively early when the ration lacks tryptophane or the water-soluble vitamine. No evidence has been obtained in this research that the cells of a tumour possess any powers of synthesis which are not found in animal cells of similar type. Analyses by the Hausmann method of the distribution of nitrogen in the tissues of the tumour and the organs of the rats, have revealed no differences in the constitution of the proteins of the tumour and of the host. It has not been possible, by any dietetic restriction, to inhibit the growth of the tumour without serious impairment of the nutrition of the host. There would thus appear to be little hope of bringing about any alleviation of neoplasms in man by the imposition of dietetic restrictions.

DOPE POISONING.

In the manufacture of aeroplanes and seaplanes, the material employed is impregnated with a solution of acetate of cellulose, in a volatile solvent. This solution is called dope, and the person applying it is now known in the trade as a doper. When dope was first utilized in this manner, the solvent chosen was tetrachlorethane. All the chlorethanes appear to be anæsthetic substances. Ethyl chloride, or monochlorethane, is freely used in surgical practice for short operations; dichlorethane was used for a short time as an anæsthetic, but proved too dangerous. Ramsay and McKendrick found that it was useful as a rubefacient about the year 1878, while du Bois recorded, in 1888, that it caused opacity of the cornea in rabbits. The third member of the group, trichlorethane, was first used as an anæsthetic by Tauber, in 1880, but has proved itself of little value, partly on account of its toxicity and partly because of the slowness of its action. There are two isomers of tetrachlorethane; the asymmetrical compound is said to be contained in small quantities, together with small quantities of trichlorethane, in some preparations of anæsthetic ether. It is not used alone, because of its unreliable action. The pentachlorethane has apparently not been investigated from a pharmacological point of view.

Dr. J. A. Codd[1] gives an interesting account of his observations on dopers employed in a certain motor works. It appears that after tetrachlorethane had been employed in dope for a short time, it became evident that the substance was a powerful protoplasmic poison. It induced changes in the liver cells similar to those caused by chloroform. Deaths were reported among dopers. The symptoms consisted in drowsiness, headache, pain in the hepatic region, dryness of the throat, "muddiness" of the conjunctivæ, jaundice, coma and death. The muddiness of the conjunctivæ reminds us of du Bois's observation in rabbits with dichlorethane. Dr. Codd relates that the naval authorities required a temperature of 17.2° C. for the process, in order that the evaporation of the solvent might be rapid, and the impregnation of the material with the acetate of cellulose complete. The Home Officer (Factory Branch) insisted on an adequate ventilation to carry off the vapour. As the temperature of the workshops had to be relatively high, the concentration of the vapour in the air was considerable. When Dr. Codd first examined the dopers, he found that nine out of 34 complained of drowsiness, two complained of hepatic pain, two of severe headache and one had all three symptoms. It will be noted that these symptoms were subjective, and consequently he became somewhat critical in his further observations. Muddiness of the conjunctivæ was noted among dopers, but also among others working in the same trade. He introduced a system of frequent changes to other kinds of work, especially for those dopers who showed the slightest objective sign, or who complained of the well-known symptoms of "dope poisoning." At a later stage other dopes were substituted. Amyl nitrite was used as a solvent, and naturally caused symptoms of nitrite poisoning, including flushing of the face, throbbing and fullness in the head, cough, etc. A dope called raftite, which is said to be free from tetrachlorethane, led to many complaints of nausea and vomiting, as well as dryness of the throat. Dr. Codd was able to show that, in some cases, these symptoms were complained of very freely, while one girl worker gave a lead. To overcome the difficulty, he suggested that the planes should be allowed to dry after they had been doped, before they were taken to the beading room, where these complaints were rife. Still later, acetone was used as a solvent. Apparently the only symptoms caused by this form of dope are thirst, polyuria and a bad taste in the mouth, while one woman complained of excessive appetite. No doubt the adequate ventilation and the careful control have been responsible for this happy result. When it is remembered that from 15 to 20 c.cm. of acetone produces a temporary anæsthesia, and 1 gramme per kilogram body weight causes permanent renal changes, it becomes evident that caution should be employed when this substance is evaporated in a workshop.

[1] *Public Health*, March, 1918.

THE GLOBOID BODIES OF POLIOMYELITIS.

The differential diagnosis of poliomyelitis depends on the transmissibility of the disease to monkeys and the power of a serum of a person or animal, after recovery from the disease, to prevent the development of experimental poliomyelitis. Less re-

liance can be placed on the character of the lesions, either in the patient or in the monkey after experimental inoculation. In 1913, Simon Flexner and H. Noguchi described certain globoid bodies which they were able to cultivate from the affected tissues of patients. They claimed that these bodies were the causal organisms of the disease. Confirmatory evidence of this contention is extremely difficult to obtain, largely because it appears that the organisms resist artificial cultivation, and apparently undergo attenuation, so that the results of inoculation of cultures have rarely been the production of lesions indistinguishable from those of poliomyelitis. Many bacteriologists have endeavoured to devise methods of cultivating these globoid bodies, but the majority apparently have found the difficulties insuperable. Hitherto, success has only attended the experiments when Noguchi's technique has been adopted. The essentials for growth appear to be that complete exclusion of oxygen must be achieved, that the medium must be ascitic, or other body fluid of exactly the same reaction as blood, that the fluid must contain portions of sterile normal tissue, *e.g.*, rabbit's kidney, and that sub-cultures must be made again and again until the organisms become adapted to their new environment, and take on a more or less vigorous growth. This work necessitates great patience and the most meticulous care in technical manipulation. Artificial contamination means the loss of valuable material and the destruction of weeks, or even months of work. Notwithstanding that the cultivation has no direct diagnostic value at present, and that by its means absolute proof of a causal relationship to poliomyelitis is far from proved, it is important that this work should be repeated and modified many times, if progress is to be made concerning the nature of this affection. Dr. Wilson G. Smillie has carried out a series of very careful experiments,[1] and has suggested slight modifications, which apparently lead to better results than those obtained when Noguchi's original method is employed. In the first place, he has found that the use of the hydrogen-nitrogen jar, working on the principle of the catalytic action of platinized asbestos upon hydrogen and oxygen, is far preferable to the ordinary vacuum jar. In the next place, he found that if the monkeys were killed when *in extremis*, the cultures usually contained *streptococci*, and consequently the growth of the globoid bodies was obscured. The animals killed when the manifestations of the experimental poliomyelitis were at their height, yielded cultures free from secondary infections. He obtained twenty-two cultures from the tissues of seven monkeys suffering from experimental poliomyelitis. Of these cultures, twenty were derived from the central nervous system, and two were derived from the spleen. The bodies were cultivated through several generations, and when well established their characters were studied. The property of producing acid from sugars was tested by means of estimations of the hydrogen ion concentration. Indicators cannot be employed in the medium, since they inhibit the growth. In no case was any increase of acidity caused when the growth took place in the presence of dextrose or lactose. A few attempts to reproduce the disease in monkeys by inoculations of cultures led to negative results. It would seem that further study is needed of the essentials for the cultivation of the globoid organisms, before the question of their pathogenicity can be established or disproved.

[1] *Journal of Experimental Medicine*, March 1, 1918.

Naval and Military.

CASUALTIES

On May 8, 1918, two casualty lists, the 397th and the 398th, were issued to the public, and on May 11, 1918, the 399th was issued. Among a very large number of names, no less than 142 were of men holding commissions in the Australian Imperial Force. Of these, three were members of the Australian Army Medical Corps. Captain Hyman Symonds, Captain William Rae Young, and Captain William Stuart Hawthorne are reported to have been wounded. Two of these officers are attached to Field Ambulances and one is a Regimental Medical Officer.

APPOINTMENTS.

The following appointments, etc., have been published in the *Commonwealth of Australia Government Gazette*, No. 69, of May 9, 1918:—

Major E. F. Lind, Australian Army Medical Corps, to be Deputy Assistant Director Medical Services, 3rd Australian Division, 11th January, 1918.

Army Medical Corps.

Lieutenant-Colonel J. S. Purdy, D.S.O., from No. 10 Field Ambulance, to command No. 3 Australian General Hospital, and is granted the temporary rank of Colonel whilst commanding. 17th January, 1918.

Major G. W. Macartney, from No. 1 Australian Casualty Clearing Station, to command No. 10 Field Ambulance, and is granted the temporary rank of Lieutenant-Colonel whilst commanding. 16th January, 1918.

To be Major—

Captain (temporary Major) R. H. Burkitt. 4th September, 1918.

Major G. E. M. Stuart to command No. 3 Light Horse Field Ambulance, and is granted the temporary rank of Lieutenant-Colonel whilst commanding. 12th November, 1917.

It has been announced that Dr. Eric Sinclair, Director-General of the Insane of New South Wales, has been appointed Principal Medical Officer of the No. 2 Military District.

Major W. S. Kent Hughes, M.C., of the 8th Light Horse Regiment, has been appointed Deputy Assistant Quartermaster-General. Major Kent Hughes is the son of Dr. W. Kent Hughes, of Melbourne. We tender our congratulations to him on the honour conferred upon his son.

Our attention has been drawn to an interesting annotation which has been published in the *Australian Pharmaceutical Notes and News*, of May 1, 1918, dealing with the number and origin of males of military age in Australia. The figures have been culled from the Commonwealth Statistician's report. It appears that there were, on September 15, 1915, 2,374 medical practitioners of military age, 781 medical students, 2,739 dentists, and 2,547 pharmacists in Australia. We have no information concerning the number of dentists or pharmacists on active service at that date. There is evidence, however, that approximately 750 medical practitioners had left Australia on war service, and, of these, a very large proportion were of military age. Mr. Knibbs gives the number of individuals in each class of enemy birth-place, and of enemy parentage but not of enemy birth-place. It appears from these figures that 1.18% of medical practitioners were of enemy birth-place and 2.65% were of enemy parentage. Among the dentists, 0.36% were of enemy birth and 2.3% of enemy parentage, and among the pharmacists 0.58% were of enemy birth and 1.8% were of enemy parentage but not enemy birth. Only 0.38% of medical students were born in enemy countries, but 4.4% were of enemy parentage.

Abstracts from Current Medical Literature.

DERMATOLOGY.

(171) Sporotrichosis.

Wallace Beatty describes the first case of sporotrichosis to be reported from Ireland (*Brit. Journ. Dermat. and Syphilis*, October-December, 1917). The patient was a boy, aged 15½ years, who had been working in a brush factory, and had been handling bass. The history showed that the condition had started as a small pimple on the front of the wrist, and that a piece of bass had accidentally stuck into it, causing it to bleed freely, after which the pimple showed no inclination to heal, but became a small, open sore. Four days later a small, red swelling was noticed 10 cm. above this spot, and soon afterwards another swelling appeared between it and the primary sore. Later, four smaller lumps, in a straight line with the first two, appeared higher up, two in the upper part of the forearm, and two at the inner side of the arm. On examination, an almost healed ulcer was seen on the flexor aspect of the wrist, whilst 5 cm. above this, and situated over the lower end of the radius, was an oval, red swelling, soft to the touch, and giving a sense of fluctuation. Again, 5 cm. above this was another soft and fluctuating oval swelling, which, like the previous one, had its long axis running in the direction of the limb. Above this was another similar elongated swelling, made up of four small nodules close together, and 2.5 cm. above this was another small, inflammatory nodule. Running up the forearm could be felt and seen a hard cord, uniting the nodules. Following up the line of swellings in the forearm, from the primary lesion upwards, a small red elevation was seen in the lower third of the arm to the inside of the biceps, and 5 cm. higher a small nodule was felt under the skin. With sporotrichosis in view, some pus was drawn off with a sterile syringe from one of the inflammatory swellings, and placed upon a tube of maltose agar. Six or seven days later, a growth became apparent, as a number of small whitish convex elevations, which in a few days became brown, and finally black. Subcultures on glucose and maltose agar, after some weeks, gave the typical, raised, convoluted, black cultures, which, on microscopical examination, exhibited the typical mycelium and spores of sporothrix. In this examination two methods of staining, which were found satisfactory were adopted: (1) The culture, first dried and fixed, was stained with a 50% Delafield's logwood for ten minutes, then washed, dehydrated with alcohol, and mounted in Canada balsam. (2) The formic acid and borax-methylene blue method, which Sabouraud recommends for staining the hairs and scales of ringworm, was modified by leaving the culture in the stain for several minutes in place of one minute, as recommended for the staining of ringworm hairs. With the prolonged staining the mycelium was found to be much more satisfactorily demonstrated. The author states that the case is an example of the lymphangitic form of sporotrichosis, starting with a primary lesion "the sporotrichosis chancre."

(172) Spondylolisthesis or Lumbo-sacral Dislocation.

In dealing with lumbo-sacral dislocation or spondylolisthesis, Byron C. Darling (*Amer. Journ. Röntg.*, January, 1918) describes the characteristic posture found in this condition. He holds that violence is the direct cause of the condition, although certain anatomical variations may favour the establishment of the same. He emphasizes the gradual onset of the symptoms. The prognosis is good as far as functional results are concerned, but a cure or replacement has never been reported. He is of opinion that the condition is not uncommon, and should always be considered when injuries of the lower spine occur. He describes two types of dislocation. When examined by means of Röntgen rays only four whole lumbar vertebræ show above the upper border of the sacrum; the body of the fifth is well below and in front of the sacrum. The upper aspect of the fifth vertebra is found to be directed forwards. The transverse process of the fifth lumbar vertebræ is usually seen in the skiagram to be below the upper border of the sacrum.

(173) Congenital Ichthysiform Erythrodermia.

Herbert Brown states that congenital ichthysiform erythrodermia, a rare disease, appears either at birth or soon afterwards, and that it differs from true ichthyosis in the fact that in the former there is erythrodermia, as well as implication of the flexures of the palms of the hands or soles of the feet (*Brit. Journ. Dermat. and Syphilis*, October-December, 1917). The author records the case of a man, aged 31, who had suffered from this affection since early infancy, scalp was dry and scaly, resembling a mild seborrhœic dermatitis, but there was no erythrodermia. There was well-marked erythrodermia of the face, involving the cheeks and ears, and spreading on to the neck. On the front of the chest and abdomen, exclusive of the area over the sternum and the suprapubic region, the skin was almost entirely covered with very dark, adherent, horny, hypertrophic, epidermic crusts, quadrangular in shape, and brownish-black in colour. On the back there was generalized thickening, and a slight horny condition over the scapular areas. The hair in the axillæ and in the pubic region became scanty, whilst the skin of the penis, scrotum, and buttocks was greatly thickened. The upper extremities showed well-marked, symmetrical, narrow bands of erythrodermia, and keratoses, extending from the axillæ down the inner sides of the flexures to the elbows. These bands were sharply demarcated from the more normal, but thickened skin over the remainder of the arms, presenting an appearance similar to that seen in *ichthyosis hystrix*. The skin over the wrists was almost hide-like, and of a dusky red colour. A similar appearance was in evidence on the dorsal surfaces of the hands and fingers. On the palmar surfaces of the hands and fingers the hyperkeratosis was extreme, and assumed a warty appearance, with well-marked fissuring along the natural lines and folds. The soles of the feet were practically normal, whilst the remainder of the lower extremity showed a generalized thickening of the skin, but without hyperkeratosis or apparent erythrodermia.

(174) Value of Roentgen Ray in Diagnosis of Pulmonary Tuberculosis in War Time.

Lawrason Brown (*Journ. Amer. Med. Assoc.*, February 23, 1918) discusses the feasibility and advisability of the extensive use of X-rays in diagnosing early pulmonary tuberculosis in soldiers in the Army. He considers that this method of diagnosis should be employed for the purpose of distinguishing between acute and non-important bronchitis, with physical signs which simulate those of pulmonary tuberculosis. By its means men with advanced pulmonary tuberculosis, whose physical signs suggest a slight lesion, can be detected and rejected for service. The presence of lesions indicated by physical signs can be verified in this way, and deep-seated, acute, or sub-acute pulmonary tuberculosis can be detected when only indefinite physical signs exist. It is also possible to reveal old basal pleurisy with the aid of X-rays. He points out that to do this would require numerous expensive installations and the appointment of men whose training rendered their interpretation of skiagrams reliable. The question of the value of a single skiagram is discussed, and for general work the conclusion is reached that a single examination is sufficient, and that stereoscopic skiagrams are very rarely essential.

(175) An Italian X-ray Localizer.

A description is given (*Lancet*, January 19, 1918) of an X-ray localizer, designed and made by Carlo Baese, of Florence, and now largely used in the Italian Army. It consists of a light frame in the shape of an E, mounted on a horizontal pin in the position of the small central tongue of the E, the upper limb of the E carrying the screen, the lower one the tube. The vertical level of this E can be varied. The localization depends on the level of the apparatus being arranged so that the position of the foreign body does not move, either in the same direction, or in the opposite direction, with the movement of the apparatus in the horizontal plane. The apparatus appears to be extremely simple and

practicable in localizing the depth of foreign bodies, and the actual manipulation in estimating the depth seems to be only a matter of a mintue or two.

BIOLOGICAL CHEMISTRY.

(176) Urinary Nitrogen.

C. Richet has determined the percentage values of the urea-nitrogen and of the total nitrogen upon two individuals, maintained under similar conditions (*C. R. Soc. Biol. Paris*, February 9, 1918). The two subjects have been given the same diet for eight days. On three days a diet rich in proteins has been supplied. The urine has been collected for periods of two hours from 8 a.m. to 6 p.m.. The percentages of total nitrogen and nitrogen derived from urea have been estimated according to the method of Yvon. In one subject the percentage figures for the amounts of nitrogen have remained practically constant during each of seven days, while the range of variation from day to day has been slight. In the other subject, the percentages of nitrogen have steadily increased during the period of each daily experiment, so that in the evening the figure is twice or thrice that of the morning. The author discusses the mechanism by which the ingestion of water is adapted to the requirement of the individual in respect to the concentration of nitrogenous constituents of the urine.

(177) Nitrogenous Extractives of Tumours.

J. C. Drummond (*Biochemical Journal*, December, 1917) has examined the nitrogenous substances which can be separated from a number of human mammary carcinomata, from a human lymphosarcoma, from a large secondary hepatic deposit to a human pancreatic carcinoma, and from a series of avian tumours, known as the Rous chicken sarcoma. The extracts were made with water containing a little acetic acid. The protein was removed by heat coagulation. After precipitation with basic lead acetate, the extracts were treated with phosphotungstic acid. The precipitate was separated in the usual way, and treated to obtain four fractions containing the purins, histidine, arginine and lysin. The filtrate was examined for monoamino acids. From more than four kilograms of the avian tumour the extractives isolated in a pure state from the phosphotungstic acid precipitate were 0.7 gm. adenine picrate, 0.4 gm. hypoxanthine nitrate, 0.12 gm. arginine picrolonate, 16 gm. creatinine picrate, and small weights of histidine hydrochloride and carnosine. From the phosphotungstic acid filtrate the author isolated 0.6 gm. tryosine and a little creatinine picrate. From 600 gm. of tissue from mammary carcinomate, the author isolated 0.2 gm. creatinine picrate, and small amounts of adenine picrate and tyrosine. From the lymphosarcoma, which weighed 900 gm., the author obtained 0,02 gm. guanine and 0.42 gm. adenine picrate, 0.2 gm. creatinine picrate, 0.02 gm. tyrosine and 0.65 gm. leucine. From the secondary carcinoma of the liver, weighing five kilogrammes, the author obtained 0.07 gm. guanine, 0.25 gm. adenine picrate, 0.37 gm. creatinine picrate, 0.45 gm. leucin, and 0.27 gm. tyrosine. In the extracts of this tumour small amounts of xanthin and hypoxanthin were also identified.

(178) Occult Blood in Fæces.

W. G. Lyle and L. J. Curtman have studied the guaiacum test for occult blood in fæces and have introduced a new method of using the test (*Journ. Biol. Chemistry*, January, 1918). The benzidine test has given erroneous results in their hands, while the use of an alcoholic solution of guaiacum resin has several advantages. These are that the gum is not of fixed composition, that gums from different sources vary in their sensitiveness and that the solutions must be freshly prepared. These disadvantages are overcome by using guaiaconic acid, but this reagent is expensive and not always on the market. The authors describe a process for treating crude gum guaiac with potash, whereby a preparation which is both stable and sensitive, is obtained. This preparation is dissolved in alcohol. The authors perform the test as follows: About 10 gm. fæces are stirred with 25 c.cm. distilled water. The mixture is boiled for several minutes with constant stirring. When cold, one-half is transferred to a glass stoppered bottle and treated with 5 c.cm. pure glacial acetic acid and 25 c.cm. ether. The mixture is well shaken and then allowed to settle. Into a test-tube are placed 2 c.cm. of the ethereal extract, 0.5 c.cm. of the alcoholic solution of the guaiacum preparation and, finally, one to five drops of 30% perhydrol. A blue colour shows the presence of blood. A series of experiments designed to show the sensitiveness of this test have demonstrated that it will detect an admixture of one part of blood to 10,000 parts of fæces. The method has been used in the examination of the stools of 500 hospital patients kept upon meat-free and soup-free diets. The results have been entirely satisfactory. Provided the patients took neither soup nor meat, the test was negative. No positive results have been obtained with diets containing milk foods.

(179) Estimation of Fæcal Indol.

O. Bergheim has made a study of the method for estimating indol in fæces devised by Herter and Foster (*Journ. Biol. Chemistry*, October, 1917). This method depends upon the colourimetric determination of the blue compound formed between indol and betanaphthoquinone sodium monosulphonate. This substance does not react with skatol and the colour developes quantitatively under a great variety of conditions. The author has carried out the estimation by separating the indol from phenols by distillation of the fæces in alkaline solution. Ammonia is removed from the distillate either by shaking with silicate, as in Folin's method for determining ammonia in blood, or by a second distillation in acid solution. The second distillate or the filtrate from the silicate is mixed with the reagent and alkali to develope the blue-coloured substance which is extracted with chloroform and estimated by comparison with a standard colour. Details of the methods are given. The results of a series of estimations of human fæces are included. These show that the indol disappears from the fæces upon standing, even when the fæces are kept in an ice box.

(180) Vitamine of Yeast.

J. C. Drummond (*Biochemical Journal*, December, 1917) endeavours to show that the substance promoting growth soluble in water, is identical with the anti-neuritic vitamine present in yeast. The experiments were performed on black rats, of the species, *Mus norvegicus*, reared under careful observation in the laboratory. The rats received as a basal ration a mixture of caseinogen, 18 parts, starch, 40 parts, agar, 5 parts, sucrose, 17 parts, butter-fat, 15 parts and salt mixture, 5 parts. Each article of the diet was purified before use by extractions designed to remove all traces of the water-soluble food accessory substance. The diet was tested upon rats, and found to be quite satisfactory, when combined with preparations of yeast containing the missing food hormone. In addition to dried yeast powder, the author used a commercial preparation of yeast, known as "marmite," which was found to be rich in growth-promoting accessory substance. The treatment of dry yeast by prolonged extraction with alcohol, and with ether, does not diminish the quantity of vitamine. The accessory substance dialyses and can be removed in this way from "marmite." Heating to 100° C. does not affect the vitamine, but heating to 120° C. for 30 minutes, in an autoclave, lessens the activity of the yeast. The action of acids and alkalis on the yeast and on yeast extracts was studied. These reagents destroy the vitamine slowly, the speed varying with the concentration and the temperature. A large number of attempts to isolate the water-soluble substance was made without success. Owing to the readiness with which precipitates absorb the growth-promoting body, its separation is attended with great difficulty, as the loss at each stage of separation is so considerable. The author points out that his results support those of McCollum and Kennedy as to the identity of the growth-promoting accessory, soluble in water, with the anti-neuritic vitamine. The properties that he has tested in regard to yeast as a source of substance promoting growth, are identical with those of the vitamine endowed with anti-neuritic qualities. The author protests against the use of the term vitamine and trusts that the discovery of the chemical nature of the substance will render its biochemical significance precise.

THE INSANE AND MENTALLY DEFICIENT IN SOUTH AUSTRALIA.

The Inspector-General of Hospitals, Dr. Bedlington H. Morris, issued his report for the year 1916 on the Mental Hospital at Parkside and on the certified mental defectives in October, 1917.

In an introductory address the Inspector-General calls attention to the urgent need of the establishment of a receiving house. At the present time a portion of the Parkside Mental Hospital is set aside for persons recently admitted. He quotes from the annual report of the Inspector-General of the Insane of New South Wales in support of his contention, and shows that reception houses have the effect of avoiding the necessity of many persons being certified as insane.

He also calls attention to the urgent necessity of the establishment of a properly equipped laundry, of better bathing facilities, and of a modern kitchen and stores. It certainly does not reflect credit on those responsible for the state of affairs that the frequently repeated demand for a properly equipped laundry, for hygienic bathing facilities, and for clean and adequate kitchen and stores in an institution containing over 1000 persons should be ignored year after year. The kitchen and stores are among the worst we have ever visited. It has become the duty of the Government to find money for this necessity without any further delay.

Dr. Bedlington Morris also makes a very reasonable claim in asking that the present morgue should be modernized, and that a small pathological block should be erected, in order that anatomical and histological investigations may be undertaken.

In the interests of patients who have been discharged, some provision should be made, in order that those who are homeless and friendless could receive care and assistance to enable them to benefit from the treatment they have received while in the institution. The Inspector-General makes the excellent suggestion that an after-cure association, analogous to the Prison Aid Association, should be formed. He points out that it is highly undesirable for children to be inmates in a mental hospital. Imbecile children are best taken care of in special institutions, where much can be done to ameliorate their unfortunate condition.

Difficulty has been experienced in the endeavour to procure the services of an additional resident medical officer. The Institution is suffering from an insufficient medical staff, but, owing to the shortage of medical practitioners obtaining at present, it has hitherto been impossible to appoint a suitable man. Arrangements have been made for the appointment of a visiting dental surgeon.

The Inspector-General, in concluding his report, refers to the necessity of the employment of modern occupational therapy. The facilities at Parkside are too restricted to enable him to take full advantage of these remedial measures.

From the Inspector-General's report, from the report of the Acting-Superintendent, Dr. J. C. R. Lind, and from the statistical tables appended much information concerning the growth of the institution and concerning the patients under treatment during the year is obtainable. It appears that during the 14 years from 1846 to 1860 513 persons were admitted to the Institution. During the following ten years the number of admissions varied between 63 and 98 per annum. From 1870 to 1877 the admissions increased up to about 200, and during the following 32 years they remained between 100 and 250 per annum. Since 1910 there has again been a material increase in the number, and in 1916 302 patients were admitted, which is the highest number yet recorded. Of these 302 patients 283 were new patients and 19 were returned from trial. There were in the hospital at the beginning of the year 1,137 patients. The total number of patients under care during the year was therefore 1,439. Of these, 124 died, one was discharged after the medical officers had determined that he was not insane, 149 were discharged "recovered," nine were discharged "not improved" and two escaped. The average number of patients in residence during the year was 1,143.

In the course of 60 years the average number of patients in the mental hospitals has increased from 152 to 1,143. A curve plotted with the years in the ordinate and the number of patients in the abscissa is very nearly a straight line. It will be seen, however, that the curve of increase of population plotted for the same period is also nearly a straight line, and is even steeper than the former curve. The increase in the number of admissions has been far less regular, although the total direction of the curve has a steepness mid-way between that between the increase of population curve and that of the increase in the number of resident patients. The percentage of recoveries on the total number of admissions was 55.3 in the 14 years between 1846 and 1860, and has varied irregularly since that time. The lowest record was 41.1% in 1906 and the highest was 76.4% in 1874. In 1861 the recovery rate was 48.5%, and in 1916 it was 48.3%. It is not surprising that the records of the recovery rate should contain so little information. Recovery in the sense used for this purpose means a temporary or permanent disappearance of symptoms and not necessarily a cure of disease. In the next place, the rate is calculated on the basis of the number of persons committed to the asylums in the course of a definite time. It is quite obvious that this number, being dependent on a very large number of variable factors, must vary within wide limits.

In the next place, there is a record of the percentage of deaths on the average number of patients within the hospitals. In 1861 the figure was 6.5%. In 1867 it was 5.2%, although it had been considerably higher in the intervening years. In 1903 the highest rate was recorded, viz., 12.8%. In 1916 the rate was 10.8%. It would be useless to attempt to analyse the causes for the variation in the death-rate, since many of the patients die of senile changes and not of their brain disease, others die of intercurrent affections, while others again die of the diseases producing mental symptoms.

In a further table the relative proportion of new to relapsed cases is given. Here again great variation is met with. In 1866 there were 54 new and nine relapsed cases; in 1872 there were 89 new and two relapsed cases; in 1877 there were 165 new and 17 relapsed cases; in 1890 there were 182 new and 50 relapsed cases; in 1900 there were 175 new and 35 relapsed cases; and in 1916 there were 238 new and 45 relapsed cases. It appears that one woman recovered in 1916 who had been admitted between the years of 1846 and 1860; another woman recovered who had been admitted in 1876; one man recovered who had been admitted in 1893, and one who had been admitted in 1896; one woman and one man who had been admitted in 1898, recovered in 1916, and one man who had been admitted in 1908 also recovered in the year under review. The remainder of the patients who recovered, had been admitted during the previous four years, and the majority of them during the previous and the current year. On the other hand, a substantial number of patients died in 1916 who had been in the hospitals for many years.

Two tables are set up showing the ratio of the certified mental defectives, and of those admitted during the year to the population of England, Western Australia, South Australia, Victoria, New South Wales and Queensland. In regard to South Australia, it is seen that the number of insane to each 1000 of population has remained practically constant at from 2.5 to 2.6 for over 25 years. In England this rate was reached in 1877. There has been a gradual increase up to 3.75 in 1912. In Western Australia in 1894 the ratio was remarkably low, viz., 1.47. It reached its minimum in 1897, *viz.*, 1.29, and from that time onward it has increased steadily. In 1916 it was 3.38. In Victoria the rate was high in 1877, viz., 3.15, and in 1916 it reached 4.20. The condition was analogous in New South Wales, although the rate was consistently lower than in Victoria. In 1877 it was 2.84, and in 1916 it was 3.94. Similarly, in Queensland it was 2.05 in 1877 and 3.69 in 1916.

The occurring insanity, that is the ratio of those admitted to the mental hospitals in the year to 10,000 of population, is, in our opinion, more or less meaningless. In the course of 40 years it has varied in South Australia from 5 to 8.35, a variation of 64%. This variation appears to be haphazard, as the following figures will show:—In 1878 it was 8.15; in 1895 it was 5.89; in 1898 it was 5.06; in 1899 it was 6.98; in 1912 it was 5.42; and in 1916 it was 7. In England the irregularity is somewhat less marked,

the extremes lying around five and seven. A very striking fall, however, was recorded in 1885, when the rate was 22% less than in the preceding year. The rate was practically the same in Western Australia as in South Australia in 1916. In 1909 it reached the high level of 8.49, although a few years previously it had been but 5.33. The variation in Victoria is much less marked, while in New South Wales and Queensland it is very evident.

Of the 283 new committals referred to above it appears that 15 were instances of congenital mental disorders, 172 were on account of first attacks of insanity, 84 were on account of second or subsequent attacks, and in 12 cases it was impossible to ascertain whether the attack was a first attack or not.

The duration of the attack on admission was less than two weeks in 83 cases, of which 52 were first attacks. It was between two weeks and one month in 43 cases (29 first attack) and between one month and three months in 64 cases (36 first attack); between three months and six months in 15 cases (11 first attack), and over six months in 32 cases (26 first attack). In 41 cases the duration of the attack was unknown.

The form of insanity from which the patients suffered who were admitted during the year, is given in a special table. There were 39 instances of recent mania, 38 of senile dementia, 38 of recent melancholia, 25 of non-systematized delusional insanity, 16 of recurrent mania, 13 of paranoia, 12 of hebepherenic *dementia præcox*, 12 of confusional insanity, 11 of organic dementia, 11 of general paralysis of the insane, 10 of systematized delusional insanity (Is it not unusual to distinguish between paranoia and systematized delusional insanity?), nine of *mania à potu*, nine secondary dementia, eight of recurrent melancholia, seven of stupor, five of involutional melancholia, three of katatonic *dementia præcox* and two of volitional insanity. The ætiological factors are divided into principal and contributory. In 90 cases among those suffering from first attacks it is admitted that the principal factor was unknown. In 29 cases the critical period of old age has been held responsible. Psychiatrists are very apt to seek a cause in a normal physiological process. Senility may give rise to a general slowing down and weakening of functions, but when pathological processes appear in old people some primary cause other than senility is certainly in action. The next most common principal factor given is heredity, which was said to act in 26 cases. Epilepsy was the primary cause in six cases, other cerebral lesions in four, injury to the head in one, sunstroke in one, venereal disease in two and lead poisoning in two. The inclusion of puberty and the climateric as critical periods causing insanity and of lactation should not be accepted; these cases should be included as pathological processes coincident with these periods. Among the contributory factors alcohol is given as the cause in 28 cases, domestic worry in 23, financial worry in 7, lonely life (?) in 7, overwork in 8, war in 8, love affairs in 4, religious excitement in 2 and illegitimacy in 2. In addition, we find that febrile diseases were entered in a contributory cause in 6 cases, lead-poisoning in 3, venereal disease in one, auto-intoxication in 3, head injury in 4, sexual excess in 3, epilepsy in 3 and other cerebral lesions in 2. There were 7 cases in which the critical periods were regarded as contributory to the attack of insanity, and there were 5 cases in which the puerperium or lactation had a similar relationship. The ætiological factors in the cases other than first attacks are also analysed.

Information concerning the age of the patient at the commencement of a recent attack and on recovery is also given in tabular form. Concerning the forms of mental disorder from which those who are discharged were suffering, on admission, it would appear that recent mania was the most common, recent melancholia was the next, non-systematized delusional insanity was third and recurrent mania, *mania à potu*, senile dementia, recurrent melancholia, secondary dementia and chronic mania in the order given. The number of patients discharged after having suffered from other forms of insanity is small.

Information concerning the causes of death are given in three tables, the first specifying the causes, the second grouping the causes according to the ages of the patients at death and the third grouping the causes according to the duration of the attack. The causes are divided into principal and contributory. No less than 50 of the 124 patients died of affections of the cardio-vascular system, including 32 from cardiac disease, 3 from arterial disease and 15 from cerebral hæmorrhage. It is possible that some of the 14 deaths ascribed to syncope were, in reality, the termination of diseases of the vascular system. Similarly, some of the 42 deaths from senile decay may belong to this category. Deaths from cerebro-spinal diseases include 16 from general paralysis of the insane, 9 from organic disease of the brain, 8 from maniacal exhaustion, 7 from epilepsy, 5 from unnamed nervous diseases, 5 from melancholic exhaustion and one from locomotor ataxy. Among the other causes of death, pneumonia was responsible for 11, asthenia for 27, septicæmia for 9, bronchitis for 7, renal disease for 5 and pulmonary tuberculosis for 4. In 15 cases death ensued within one month of the onset of the attack of insanity, and in 60 within one year of the onset. Eleven patients survived the onset of their attack for 25 years or more.

The Inspector-General has issued a special report in the name of the Mental Defective Board. The information contained in this report deals largely with matters of administration and of finance.

THE HEALTH OF QUEENSLAND.

The Annual Report of the Commissioner of Public Health (Dr. J. I. Moore) for the year ending June 30, 1918, has been presented to the Under-Secretary, Home Secretary's Department, Queensland. To the report are attached appendices by the Health Officer, Director of the Laboratory of Microbiology and Pathology, Medical Officer for Enthetic Diseases, Government Analyst, Medical Officer, Central Tuberculosis Bureau and others.

Vital Statistics.

The estimated mean population of the State of Queensland for 1916 has been estimated by the Government Statistician at 677,630, showing a decrease for the year of 9,389 persons. The crude birth-rate for the same year is estimated at 27.91 per 1,000 of the mean population, and the death-rate at 11.09 per 1,000 of the mean population. The infantile mortality has been 70.4; whereas in the previous year it was 64.33 per 1,000 births. The change in this figure is probably accounted for by the diminished number of infants born, as the birth-rate has fallen from 29.35 in 1915. The birth-rate is still one of the highest in the world and the death-rate one of the lowest.

Infectious Diseases.

The number of cases of infectious diseases notified during the fiscal year has been 1,458 in the metropolitan area, and 2,974 for the remainder of the State. The total number of notified cases is rather more than 500 less than in the previous year. This decrease is mainly due to the lessened number of cases of enteric fever. In 1916 the cases of enteric fever number 1,730, while in 1917 they number 661. Scarlet fever has been much more prevalent in the metropolitan area during the year, and the number of cases of malaria notified is steadily increasing. The number of cases of diphtheria notified in the State has amounted to 1,610, showing the small increase of 44 on the number for the previous year. Pupils are debarred from attending schools after an attack of diphtheria until they are certified to be free from the disease. Carriers of the bacilli are kept under close supervision and excluded from school until three successive swabs made from the throat are found free from *B. diphtheriae*. Swabs have been made from the throats of 3,256 children attending fourteen schools in which outbreaks of the disease have been notified. The bacilli have been found on 324 of these swabs. It would thus appear that almost 10% of the children harboured the bacilli. In this connexion it may be noted that only 514 cases of diphtheria have been notified from the metropolitan area during the year. The Commissioner recommends that the Government consider the advisability of providing a home for the housing of tuberculous patients in the metropolitan area, to meet the case of persons residing in hotels and boarding-houses, where proper precautions for the safety of other members of the household

cannot be secured. This recommendation deserves public support, since it seems that many persons are infected with tuberculosis by living in contact with infective tuberculous patients, and since cases appear so often in a household containing a tuberculous inmate. The difficulty of preventing the infection of other persons in a house in which the tuberculous patient and the inmates live together is almost insuperable. The Commissioner points out that cases of acute anterior poliomyelitis are probably included among the notifications for cerebro-spinal meningitis.

During the year, 1,477 cases of venereal diseases have been reported in the metropolitan area. These notifications comprise 294 of primary syphilis, 35 of secondary syphilis, and 1,148 of gonorrhœa. Two hundred and six of the notified persons have been described as married and 1,255 as single. The hospitals reported 507 cases, medical practitioners 347 cases, and the military authorities 623 cases. During the year, 3,060 males and 316 females have attended the enthetic dispensary. The infection has been alleged to have been from prostitutes in houses where the inmates have been examined in 132 cases, from street prostitutes in 334 cases and from others than prostitutes in 895 cases. Fifty-nine persons have contracted infection without the State.

Administration.

Inspectors are stationed at Cairns, Townsville and Rockhampton. The Commissioner suggests that the emoluments of the officers at Townsville and Rockhampton should be increased by an additional allowance to cover the cost of living. In consequence of what the Commissioner observed during a visit to the town and district of Mackay, he considers it imperative that a permanent inspector should be stationed in the town.

Appendices.

The Health Officer (Dr. J. E. Thomson) emphasizes the need for prompt detection and notification of patients suffering from diphtheria. He considers that all cases that clinically resemble diphtheria should, be reported as cases of diphtheria, without waiting for the results of a bacteriological examination, and that negative results of bacteriological examinations should be disregarded, as diphtheria may be present, but no bacilli found. He considers that all contacts with patients suffering from diphtheria should receive an immunizing dose of antitoxin, as this practice diminishes the number of secondary cases in a family. Six white and two coloured patients have been admitted to the leper lazaret, Peel Island, during the year. Seven patients have died, and two patients have escaped. The leper lazaret now contains 16 white and 27 coloured patients. These patients have been treated exclusively with chaulmoogra oil. This treatment has been successful in some patients, and the early discharge of several inmates of the lazaret is expected.

The Director of the Laboratory of Microbiology and Pathology (Dr. J. J. Harris) has examined 19,982 specimens during the year, the bulk of the work being bacteriological. A number of autogenous vaccines have been prepared, and 3,089 doses of anti-typhoid vaccine. A calf has been used to make some calf-lymph for vaccination against small-pox. This vaccine has not yet been tested, and the Director urges that an early opportunity be taken to determine its potency.

The Government Analyst (Mr. J. Brownlie Henderson) reports on the chemical examination of 1,495 samples of foods and beverages. Of these samples, 301 failed to pass the prescribed tests. Taken as a whole, the results show that the principal articles of food are not adulterated, except in the case of milk. Six hundred and sixty-four samples have been taken for legal purposes, and 179 failed to pass the tests. Prosecutions have been instituted in connexion with 93 of these samples. Convictions have been obtained in all the cases in which prosecutions have been instituted, and fines amounting to £563 have been imposed. In relation to milk, 427 analyses have been made. Sixty-two samples have been found adulterated with water, and 20 samples deficient in fats. The Government Analyst points out that the practice of adulterating milk with water is as prevalent as ever in Queensland. He says "that it still pays to adulterate milk in Queensland and pay the fines when caught."

The Nurses' Registration Board report that 123 registrations of nurses have been granted during the year by examination, while 71 registrations have been granted by the Minister under Section 154 of the Health Acts. Action has been taken against two nurses for grave misconduct. In one case the name has been removed from the register, while, in the second case, the nurse has received a reprimand.

The Chief Sanitary Inspector and the Chief Food Inspector append two lengthy detailed reports on the activities of their staffs during the year.

Vital Statistics.

SYDNEY AND SUBURBS.

The vital statistics of the metropolitan districts of Sydney for the months of January, February and March, 1918, have been issued by the Government Statistician. It appears that there were 4,734 births registered during the quarter, including 325 illegitimate births. The birth-rate expressed as an annual rate was 24.36. This rate is 12.6% below the average rate for the corresponding quarter during the past five years. The illegitimate birth-rate works out at 1.72 per 1,000 births per annum. This rate is lower than the five-year average.

There were 1,633 deaths registered during the quarter, including 311 of infants under one year of age and 426 of persons of 65 years or over. The death-rate expressed as an annual rate was 8.40 per 1,000 of population, a rate 15.6% below the average for the past five years. The infantile mortality rate was 65.69. This rate shows a satisfactory decrease. In January the rate was 72.4.

An analysis of the alleged causes of death again demonstrates the extraordinary prevalence of fatal diseases due to vascular poisons. These deaths may be regarded as the indirect result in an overwhelming proportion of alcohol, syphilis and rheumatic infections. There were 237 deaths from organic diseases of the heart, 11 from endocarditis, 75 from other diseases of the circulatory system, 65 from cerebral hæmorrhage, 10 from rheumatism, etc., 5 from syphilis, 3 from alcoholism, 17 from cirrhosis of the liver. This group therefore comprises 423 deaths, and to it should be added some, if not all of the 110 deaths from Bright's disease. Diarrhœa and enteritis proved the most fatal of the infective processes, accounting for 170 deaths. Tuberculosis caused 136 deaths, pneumonia 43, diphtheria 27, broncho-pneumonia 26, enteric fever 15, meningitis and epidemic cerebro-spinal meningitis 6 each, morbilli 5, dysentery 4, influenza 2, non-puerperal septicæmia 2 and scarlatina and pertussis one each. Deaths occurring in the puerperal condition numbered 28, including 14 from puerperal septicæmia. There were 32 deaths from diabetes and 31 from anæmia, chlorosis and leukæmia.

It has been reported that Dr. Ernest William John Ireland, who has been holding a position at the Hobart General Hospital, in opposition to the policy of the Tasmanian Branch of the British Medical Association, has been transferred to the Launceston General Hospital.

Obituary.

THOMAS WILLIAM FRANCIS.

Thomas William Francis was born in Notting Hill, London, in 1863. He was educated at the Oswestry Grammar School, and gained from the first the high opinion of his masters and the affection of his comrades. His school reports were replete year after year with "very good," and it would appear that he was especially able in mastering modern languages. In 1883 he entered Saint Bartholomew's Hospital, and during the following years studied surgery under Sir William Savory, Bart., and Mr. Alfred Willett, and medicine under Sir Dyce Duckworth. In 1888 he passed the examinations entitling him to the diplomas of the conjoined Board of the Royal Colleges of Physicians and Surgeons. In the same year he acted as clinical assistant at the East London Hospital for Diseases of Women and Children, and then sailed for Australia as ship's surgeon. On his arrival in Queensland he took charge of the practice of the late Dr. D'Arcy Sugden in Bundaberg, during the absence of the latter. He was elected an honorary sur-

geon to the Bundaberg Hospital early in his career. In the course of 1889 Dr. Sugden returned to Australia and immediately took young Francis into partnership. From this time until 1912 Thomas William Francis worked up a valuable connexion, and devoted his whole energies to his very numerous patients. He was beloved equally by his lodge as by his private patients, and was trusted and respected by all. After twenty-four years he elected to move south to Mosman, near Sydney. The tributes paid to him by the members of the Hospital Board, by the Committees of his friendly society lodges, and by the School of Arts, and his pupils at his ambulance lectures and classes, bore eloquent evidence of his skill as a medical practitioner, of his qualities as a man and of his value as a friend. It is particularly significant that every patient learned to respect him as a true gentleman. In the year 1900 he joined the Royal Australian Naval Brigade. During his student life he had been an ardent amateur soldier, and had belonged to the Artists' Rifle Volunteer Corps. After leaving Bundaberg, he settled in Mosman, where he rapidly began to establish what promised to be a good practice. Within two years war broke out, and he immediately reported himself for duty. At first he performed minor duties, but in December, 1914, he was appointed Staff-Surgeon at the Cockatoo Island Dockyard. His term of appointment was three years, and during this period he was frequently involved in difficult situations, arising directly or indirectly out of the industrial unrest. The workmen in the yards, like his old patients in Queensland, at once recognized the kindly and genial nature and the high standard of honour, and appreciated the splendid services they received at his hands. Toward the end of his term of office the Naval Board offered to prolong it for a period of two or three years. As the decision had been arrived at that the position was to be regarded as a "rest" post for men who had been at sea for three or more years, Francis determined that he would not take advantage of this offer. Moreover, he recognized that it would be well for him to return to his old practice at Mosman without further loss of time. He frequently referred with regret that he was too old to "go over to the other side" in the military forces. On leaving Cockatoo Island, the Manager and workers made him a handsome presentation as a token of their regard and of their appreciation of the services that he had rendered them. The Manager, Mr. King-Salter, referred to him as a man as hard as a piece of case-hardened steel with malingerers, and as a man as soft as butter toward those who were sick and needed his assistance. A series of misfortunes awaited him after the termination of his service at the dockyard. He had let his house to a colleague for the period of three years, and was about to take possession of the house again, when the lessor took advantage of an option to purchase at the eleventh hour. He was placed in a quandary by a movement on the part of some members of the Northern Suburbs Medical Association to prevent him from again settling in his old district. Bad fortune attended a further endeavour to establish himself in another part of Sydney, and his friends and colleagues were dismayed to find him a broken man. A great depression became apparent as days of enforced idleness followed one upon another. He tolerated his distress for a short time, and struggled against the fear of inflicting poverty on those he loved. The end came—and a "white man," who had never done anyone a harm, and who had earned the affection, respect and admiration of all who knew him, passed out because others were less noble than he.

Thomas William Francis leaves a widow and one son. The sympathies of very many of his colleagues go toward them both in their sad bereavement.

Proceedings of the Australian Medical Boards.

NEW SOUTH WALES.

The following have been registered, under the provisions of the *Medical Act, 1912-1915*, as duly qualified medical practitioners:—

Alexander, Clive Reginald, M.B., Mast. Surg., 1918, Univ. Sydney.

Asher-Smith, Laira Pomeroy, M.B., Mast. Surg., 1918, Univ. Sydney.

Bradfield, Edward Ventris, M.B., Mast. Surg., 1918, Univ. Sydney.

Brett, Frances Mabel, M.B., Mast. Surg., 1918, Univ. Sydney.

Cook, William Henry, M.B., Mast. Surg., 1918, Univ. Sydney.

Dent, Rowe Clyde, M.B., Mast. Surg., 1918, Univ. Sydney.

Edwards, Rowland Campbell, M.B., 1918, Univ. Sydney.

Fletcher, Alan Rabone, M.B., 1918, Univ. Sydney.

Frizell, Malcolm, M.B., 1918, Univ. Sydney.

Garrett, Keith Morison, M.B., Mast. Surg., 1918, Univ. Sydney.

Herlihy, Frederic Cyprian, M.B., Mast. Surg., 1918, Univ. Sydney.

Hornbrook, John Hillman, M.B., Mast. Surg., 1918, Univ. Sydney.

McKee, John, M.B., Mast. Surg., 1918, Univ. Sydney.

Kidston, Thomas Arthur, M.B., Mast. Surg., 1918, Univ. Sydney.

Mitchell, Richard Stewart Roy, M.B., Mast. Surg, 1918, Univ. Sydney.

Packham, Geoffrey Brutus, M.B., Mast. Surg., 1918, Univ. Sydney.

Shand, John Cappie, M.B., Mast. Surg., 1918, Univ. Sydney.

Sharfstein, Lottie, M.B., Mast. Surg., 1918, Univ. Sydney.

Tonkin, Henry Lawrence, M.B., Mast. Surg., 1918, Univ. Sydney.

Wong, Reginald Jaep, M.B., Mast. Surg., 1918, Univ. Sydney.

Davis, Norman, M.B., Bac. Surg., 1888; M.D., 1890, Univ. Durham.

Kelmar, Erwin, M.B., Bac. Surg., 1917, Univ. Melbourne.

Alexander, Kenneth Bain, M.B., Bac. Surg., 1915, Univ. Melbourne.

Murphy, Robert Joseph, M.B., Mast. Surg., 1917, Univ. Sydney.

Roberts, William Edgar, Lic. R. Coll. Phys. Lond., 1908, M.R.C.S. Eng., 1908.

O'Halloran, Patrick Leo Alphonsus, M.B., 1918, Univ. Sydney.

Additional Registration.

Sharp, Granville Gilbert, M.D., 1918, Univ. Sydney.

Beale, John George Morris, Mast. Surg., 1918, Univ. Sydney.

Kortum, Ludwig August, Mast. Surg., 1917, Univ. Sydney.

Martin, Robert, Mast. Surg., 1918, Univ. Sydney.

VICTORIA.

The following have been registered, under the provisions of the *Medical Act, 1915*, as duly qualified medical practitioners:—

Cunningham, Charles, Talbot, M.B. *et* Ch.B., Melbourne, 1918.

Day, Arthur Frederick Cephas, Whittlesea, M.B. *et* Ch.B., Melbourne, 1918.

Breidahl, Harold George Daniel, 36 Rouse Street, Port Melbourne, M.B. *et* Ch.B., Melbourne, 1918.

Donaldson, John Ralph, 53 Walpole Street, Kew, M.B. *et* Ch.B., Melbourne, 1918.

Forster, Wilfred Richard, 87 Merton Street, Albert Park, M.B. *et* Ch.B., Melbourne, 1918.

Kennedy, John Aloysius, Cobram, M.B. *et* Ch.B., Melbourne, 1918.

Maxwell, Leslie Algernon Ivan, 162 Brunswick Road, Brunswick West, M.B. *et* Ch.B., Melbourne, 1918.

Middleton, Frederick George, Lyons Street, Ballarat, M.B., *et* Ch.B., Melbourne, 1918.

Sebire, Irene Beatrix, Noble Street, Newtown, Geelong, M.B., *et* Ch.B., Melbourne, 1918.

Stanley, Charles, Merri Street, Northcote, M.B. *et* Ch.B., Melbourne, 1918.

Stott, Ronald Gurney, "View Bank," Burke Road, East Malvern, M.B. *et* Ch.B., Melbourne, 1918.

Books Received.

THE INFLUENCE OF SUNLIGHT IN THE PRODUCTION OF CANCER OF THE SKIN, by C. Norman Paul, M.B., Ch.M.; 1918. London: H. K. Lewis & Co., Ltd. Crown 4to., pp. 57, with 43 illustrations. Price, 10s. 6d. net.

THE SYSTEMATIC TREATMENT OF GONORRHŒA, by N. P. L. Lumb, M.R.C.S. Eng., L.R.C.P. Lond.; 1918. London: H. K. Lewis & Co., Ltd. Crown 8vo., pp. 128. Price, 4s. 6d. net.

TUMOURS, THEIR NATURE AND CAUSATION, by W. D'Este Emery, M.D., B.Sc.; 1918. London: H. K. Lewis & Co., Ltd. Crown 8vo., pp. 166. Price, 15s. net.

STUDIES IN THE ANATOMY AND SURGERY OF THE NOSE AND EAR, by Adam E. Smith, M.D.; 1918. New York: Paul B. Hoeber. Crown 4to., pp. 157, with 45 illustrations. Price, $4.00.

EYE, EAR, NOSE AND THROAT, A Manual for Students and Practitioners, by H. C. Ballenger, M.D., and A. G. Wippern, M.D.; New Second Edition, thoroughly revised; 1917. Philadelphia and New York: Lea & Febiger. Crown 8vo., pp. 524, with 180 Engravings and 8 coloured plates. Price, $3.50.

DISEASES OF CHILDREN, A Manual for Students and Practitioners, by George M. Tuttle, M.D., and Phelps G. Hurford, M.D., Third Edition, thoroughly revised and enlarged; 1917. Philadelphia and New York: Lea & Febiger. Crown 8vo., pp. 599, with 47 illustrations and three plates. Price, $3.50.

LES BLESSURES DU CERVEAU, Par Ch. Chatelin, Préface du Professeur Pierre Marie; Deuxième édition remaniée et augmentée; 1918. Paris: Masson et Cie. (Collection Horizon, précis de Médecine et de Chirurgie de Guerre.) Demy 8vo., pp. 200, illustrated. Price, 4 francs.

LES PREMIÈRES HEURES DU BLESSÉ DE GUERRE, du trou d'obus au poste de seccours; Par MM. les Médecins-majors R. Bertein et A. Nimier; Préface du Médecin Inspecteur Général Jacob; 1918. Paris: Masson et Cie (Collection Horizon, Précis de Médecine et de Chirurgie de Guerre). Demy 8vo., pp. 144, illustrated. Price, 4 francs.

AIDS TO RATIONAL THERAPEUTICS, by Ralph Winnington Leftwich, M.D., C.M., M.R.C.S.; 1918. London: Baillière, Tindall & Cox. Foolscap, pp. 241. Price, 3s. 6d. net, or in paper cover 3s. net.

DREAMS, WHAT THEY ARE AND WHAT THEY MEAN, being a new treatment of an old subject, by J. W. Wickwar; Second Edition; 1917. London: A. & F. Denny. Small Crown 8vo., pp. 104.

MEDICAL ELECTRICITY, a Practical Handbook for Students and Practitioners, by H. Lewis Jones, M.D., F.R.C.P., Seventh Edition, revised and edited by Lullum Wood Bathurst, M.D.; 1918. London: H. K. Lewis & Co., Ltd. Demy 8vo., pp. 588, illustrated. Price, 15s net.

Medical Appointments.

Dr. H. H. Marshall (B.M.A.) has been appointed Honorary Physician to the Coast Hospital, New South Wales.

Dr. Albert Curtis (B.M.A.) is taking the place of Dr. J. Catarinich (B.M.A.), as Medical Superintendent of the Beechworth Hospital for the Insane, during the absence of the latter.

The appointment of Dr. P. F. V. Crowe and Dr. A. B. Carvosso, as Medical Referees for the purposes of *The Workers' Compensation Act of 1916*, and *The Workers' Compensation Act Amendment Act of 1916*, is announced in the *Queensland Government Gazette*, of May 11, 1918.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xix.

Royal Alexandra Hospital for Children, Camperdown, Resident Medical Officer and temporary Honorary Relieving Medical Officer.

Medical Appointments.

IMPORTANT NOTICE.

Medical practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429 Strand, London, W.C.

Branch.	APPOINTMENTS.
VICTORIA. (Hon. Sec., Medical Society Hall, East Melbourne.)	All Friendly Society Lodges, Institutes, Medical Dispensaries and other contract practice. Australian Prudential Association Proprietary, Limited. National Provident Association. Life Insurance Company of Australia, Limited. Mutual National Provident Club.
QUEENSLAND. (Hon. Sec., B.M.A. Building, Adelaide Street, Brisbane.)	Brisbane United Friendly Society Institute. Cloncurry Hospital.
SOUTH AUSTRALIA. (Hon. Sec., 3 North Terrace, Adelaide.)	The F.S. Medical Assoc., Incorp., Adelaide. Contract Practice, Appointments at Renmark.
WESTERN AUSTRALIA. (Hon. Sec., Health Department, Perth.)	All Contract Practice Appointments in Western Australia.
NEW SOUTH WALES. (Hon. Sec., 30-34 Elizabeth Street, Sydney.)	Australian Natives' Association. Balmain United F.S. Dispensary. Canterbury United F.S. Dispensary. Leichhardt and Petersham Dispensary. M.U. Oddfellows' Med. Inst., Elizabeth Street, Sydney. Marrickville United F.S. Dispensary. N.S.W. Ambulance and Transport Brigade. North Sydney United F.S. People's Prudential Benefit Society. Phœnix Mutual Provident Society. F.S. Lodges at Casino. F.S. Lodges at Lithgow. F.S. Lodges at Parramatta, Auburn and Lidcombe. Newcastle Collieries — Killingworth, Seaham Nos. 1 and 2, West Wallsend.
TASMANIA. (Hon. Sec., Macquarie Street, Hobart.)	Medical Officers in all State-aided Hospitals in Tasmania.
NEW ZEALAND: WELLINGTON DIVISION. (Hon. Sec., Wellington.)	Friendly Society Lodges, Wellington, N.Z.

Diary for the Month.

May 21.—N.S.W. Branch, B.M.A., Executive and Finance Committee.
May 24.—Q. Branch, B.M.A., Council.
May 28.—N.S.W. Branch, B.M.A., Medical Politics Committee; Organization and Science Committee.
May 30.—Vic. Branch, B.M.A., Council.
May 31.—N.S.W. Branch, B.M.A.
June 5.—Vic. Branch, B.M.A.
June 7.—Q Branch, B.M.A.
June 11.—Tas. Branch, B.M.A., Council and Branch.
June 11.—N.S.W. Branch, B.M.A., Ethics Committee.
June 13.—Vic. Branch, B.M.A., Council.
June 14.—N.S.W. Branch, B.M.A., Clinical.
June 18.—N.S.W. Branch, B.M.A., Executive and Finance Committee.

EDITORIAL NOTICES.

Manuscripts forwarded to the office of this Journal cannot under any circumstances be returned.

Original articles forwarded for publication are understood to be offered to *The Medical Journal of Australia* alone, unless the contrary be stated.

All communications should be addressed to "The Editor," *The Medical Journal of Australia*, B.M.A. Building, 30-34 Elizabeth Street, Sydney, New South Wales.